# commodore power play

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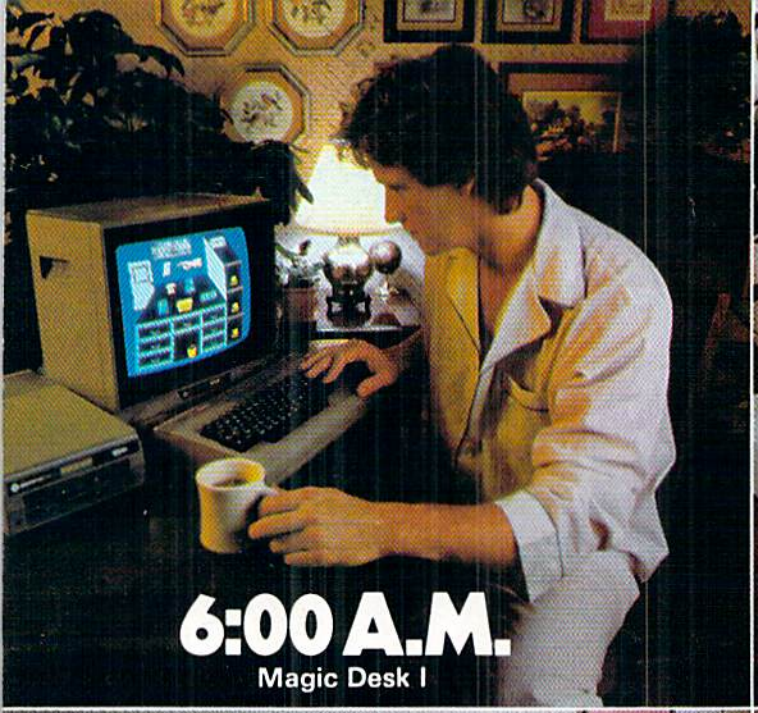


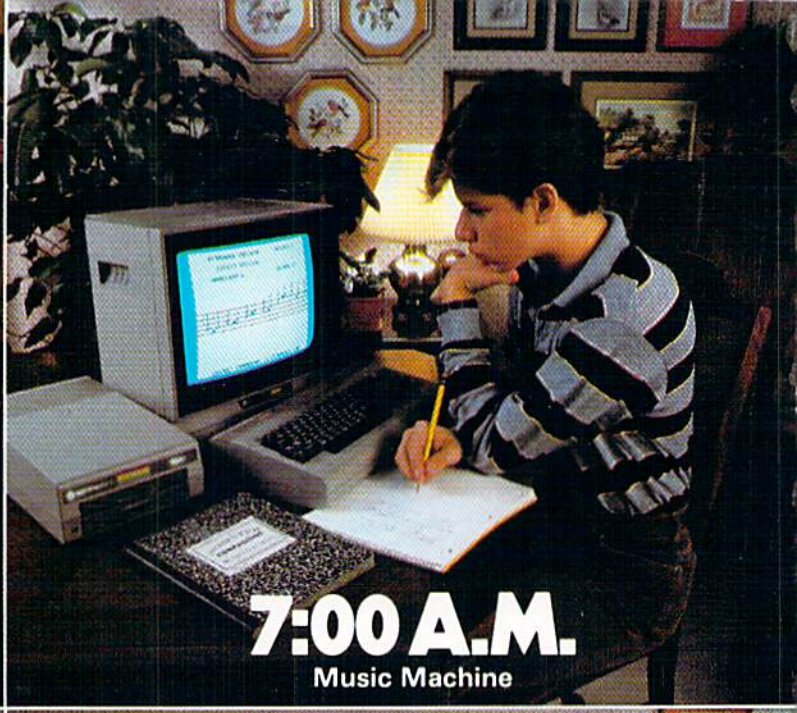


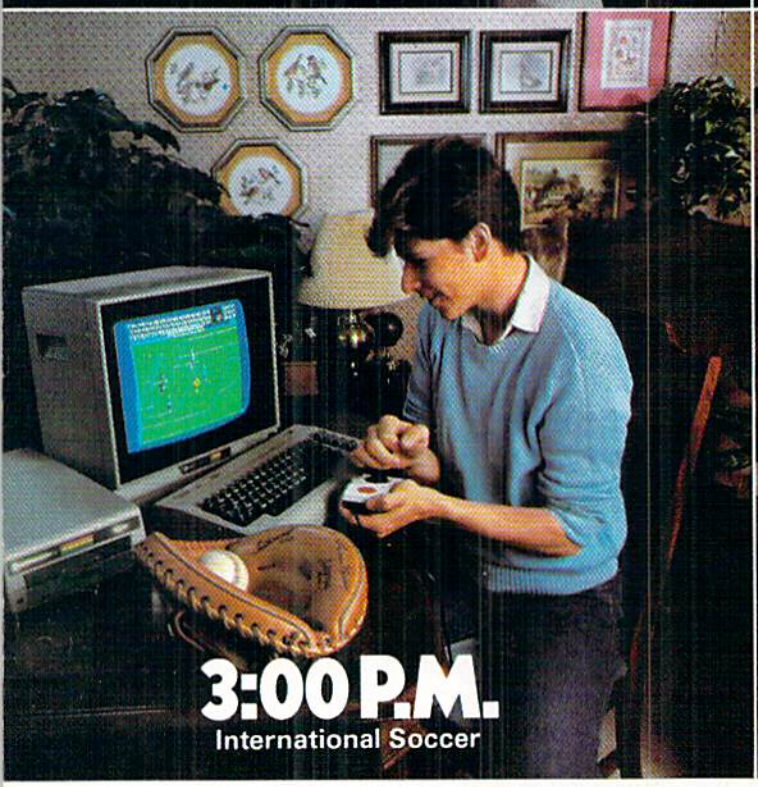

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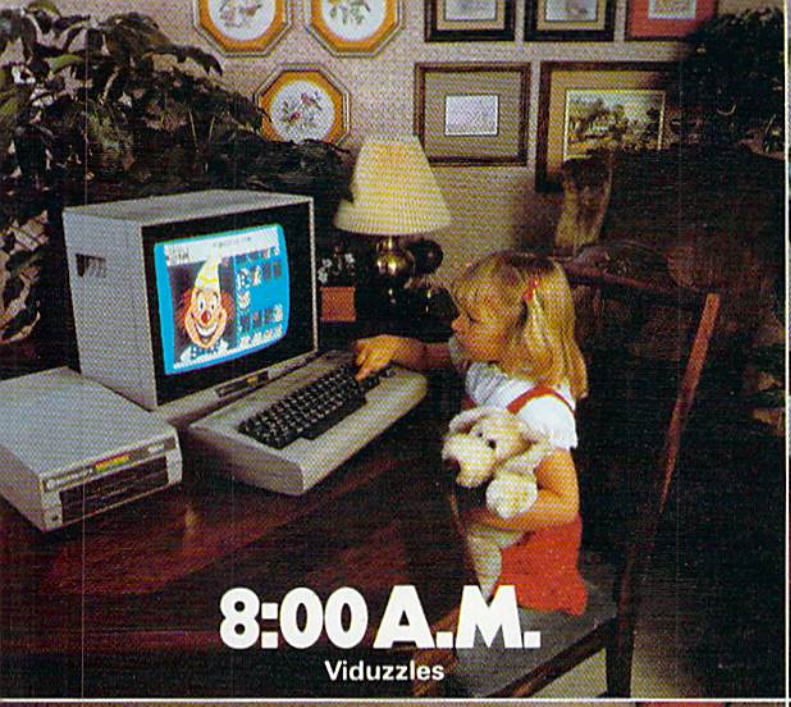

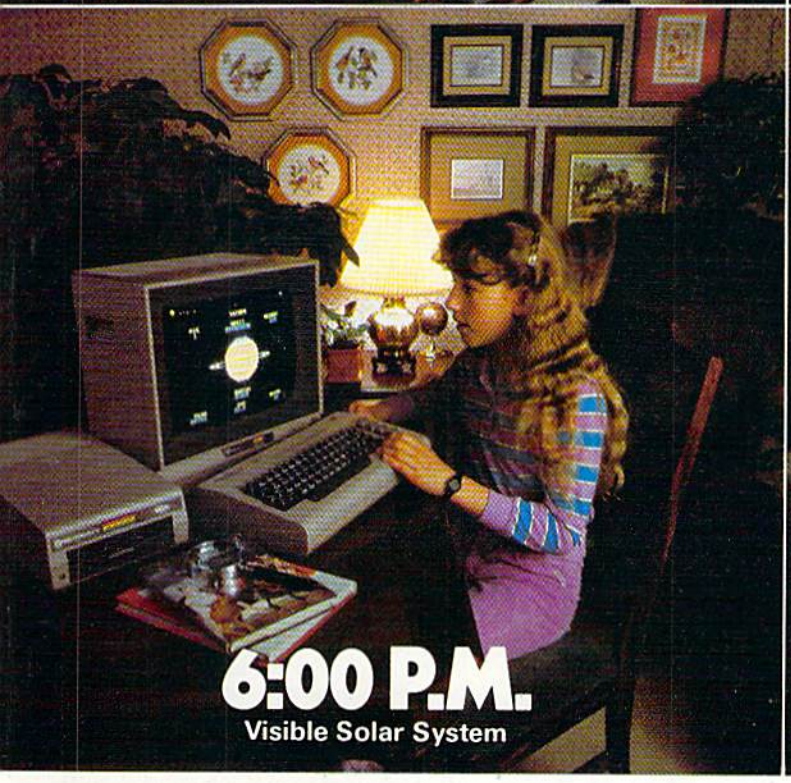


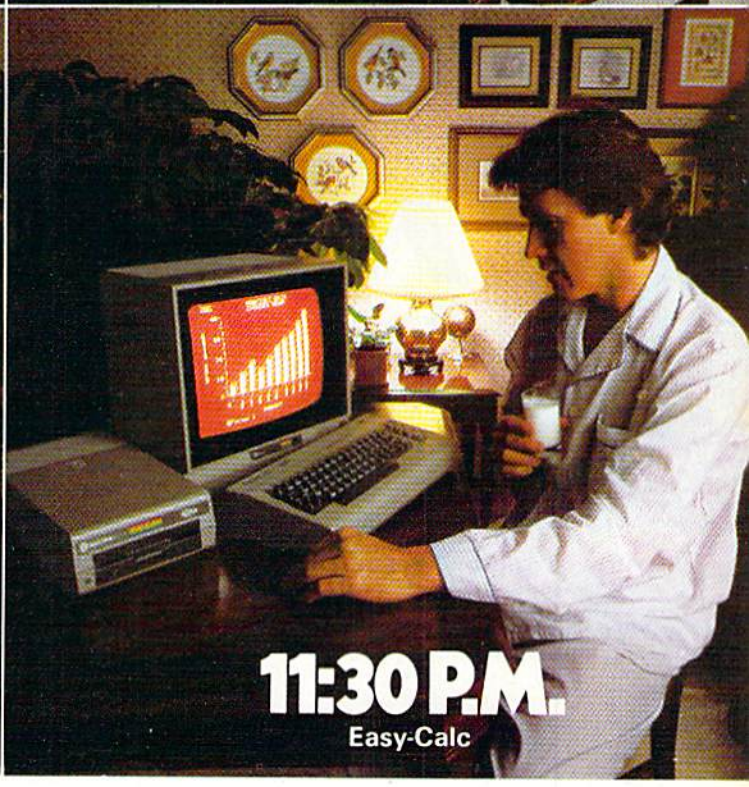


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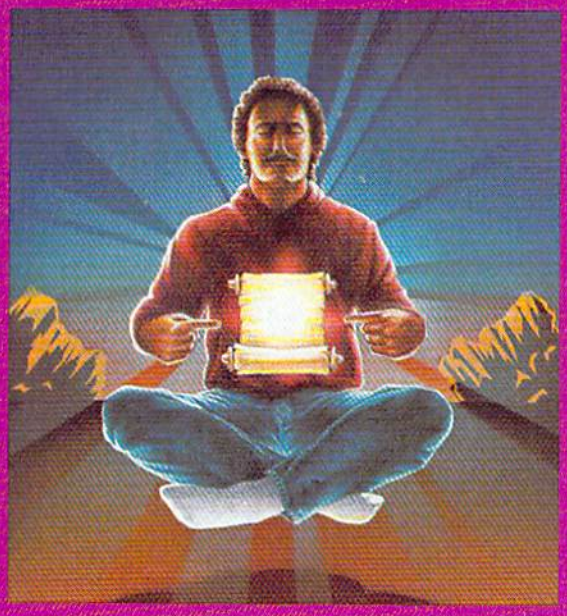

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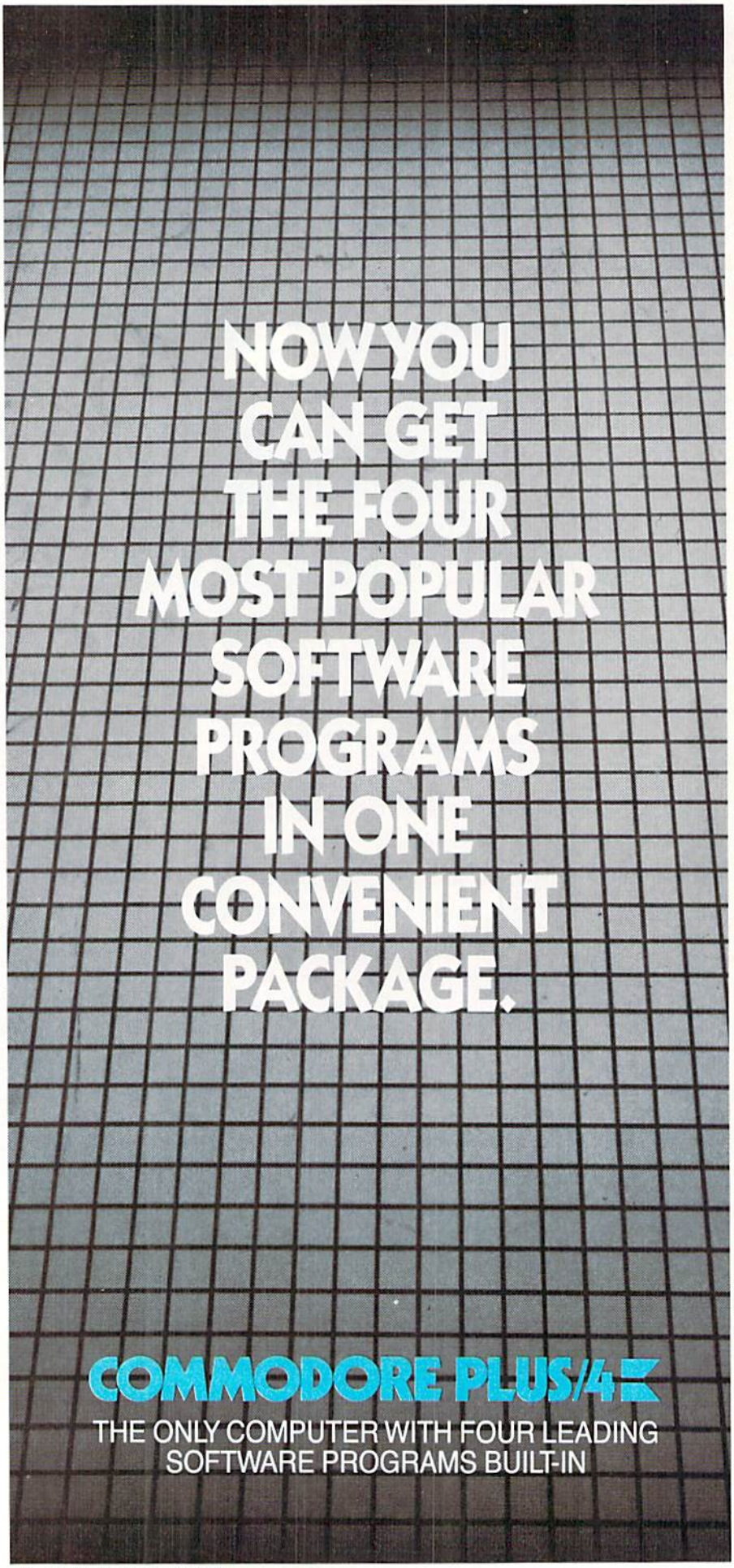
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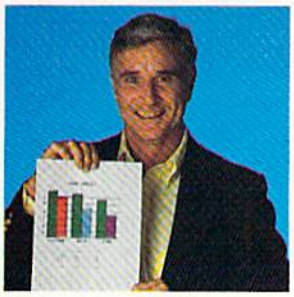

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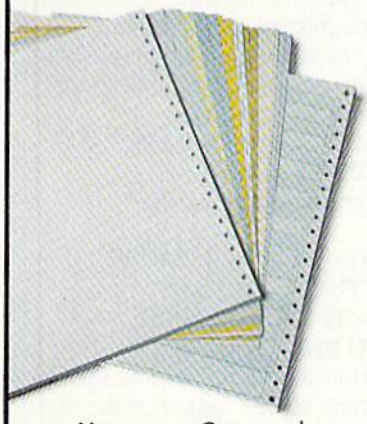

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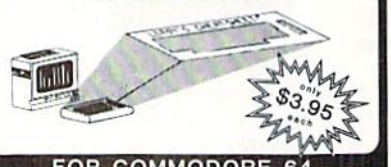


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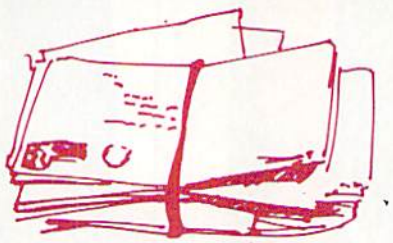

### Matching Songbooks/Records

To the Editor:

If you have many songbooks, recordings and tapes, it is possible to find yourself wondering which song is on which record and in which songbook. I did. But I've found a way to find and match recordings with songbooks by treating it like a sorting problem.

Here's how I match song titles on records with titles in songbooks: I use an alphabetizer program on my Commodore 64 copied from the book, *Porter's Programs for the Commodore 64*. You can buy a copy of this book in most area bookstores.

First, I enter the titles of songs with the record and side number in the alphabetizer. Then, I save the program on disk. Next, I print out an alphabetized list of the recorded songs. Then, I check the alphabetized list against the songbook index and I can quickly tell for which of the recorded songs I have music.

How does this sorting benefit me?

Recently, I bought a Clancy Brothers and Tommy Makem song book when I was in Edinburgh. My family had given me several records by this group. I had only to compare my alphabetized song titles against the index of the songbook to find out if I had the music for the recordings. It will save me time finding music in the future when I want to play along with a record.

Perhaps not everybody has the problem of organizing their music and record files, but if you have, the above is one way to minimize confusion.

*John Walley*
*Midland, Michigan*

### Easier Screen Editing

To the Editor:

If you change the color of your cursor before you make any editing changes, it makes edits easier to see.

First, list the part of the program that needs editing. Second, change the color of the cursor using CTRL [1 to 8] on the VIC and C64 or C= [1 to 8] on the C64 only. And last, cursor up and make your changes.

It's now easier to see where the cursor is and to see what changes have been made. If you are using a black-and-white or monochrome monitor, then use white for your listing, black for your changes, and a light gray for the background.

*Thomas Trocco*
*Bronx, New York*

### Simon's BASIC

To the Editor:

*Simon's BASIC* contains a convenient function, PAUSE, which allows the programmer to specify a pause in the program for a specified number of seconds. In Commodore 64 BASIC, a pause is often created with a FOR . . . NEXT loop.

Using a FOR . . . NEXT loop to create a delay has two disadvantages. First, unless you use the technique frequently enough to have a feel for it, you must experiment to find the proper range for your loop counter. Second, if you use one of the compilers now on the market, you will need to redetermine all of your loop counters, since the compiler makes the loops run faster.

There is another way to create a delay in the program for a specified number of seconds, without the bother of experimentation, and which will be unaffected by compiling the program. Set the value of S in line 500 equal to the desired delay in seconds:

```
... program read for pause
500 S=30:GOSUB 900:REM PAUSE
      30 SECONDS
... more program after pause
... END
900 T=TI+60*S:REM PAUSE SUB-
      ROUTINE
910 IF T=TI THEN RETURN
920 GOTO 910
```

Since this technique makes use of the internal clock, rather than the time required to execute a FOR . . . NEXT loop, it requires no experimentation and is immune to a compiler. And, if desired, you could even insert a GOSUB between 910 and 920 for a routine which does something during the pause.

*Jack Ryan*
*El Dorado, Arkansas*

FOR COMMODORE 64

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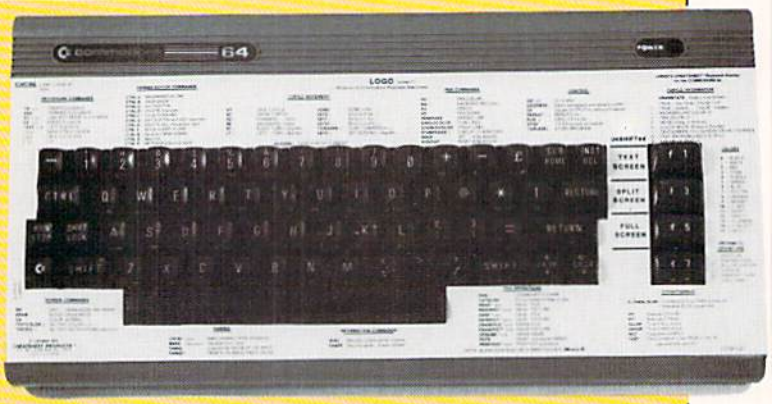


Cheatsheet Products of Pittsburgh, Pennsylvania, has designed 13 new Cheatsheets for the Commodore 64. This brings the total number of Leroy's Cheatsheets to 33. Leroy's Cheatsheets are durable, plastic-coated cut-out templates that overlay your VIC 20 or 64 keyboard.

Each Leroy's Cheatsheet is designed for a particular program or device. The Cheatsheet acts as a reference card that becomes part of your keyboard. Commands, starting instructions, marked function keys and many other helps are right there for your use.

The latest list of available Cheatsheets include: **LOGO** (sheet 1), **LOGO** (sheet 2, advanced), **Pilot, EasyCalc, Printer 1526, The Manager, Multiplan, PractiCalc 64** (and **Plus**), **Printer** (Epson-RS-80), **Superbase 64, The Consultant, Sprites Only** and a set of three blanks. Each Leroy's Cheatsheet is priced at only $3.95 plus $1.00 shipping per order (PA residents add 6% sales tax).

## Crossword Puzzle Games

**Compuzzler,** a game of strategy developed from the traditional crossword puzzle, has been released by Uptown Software of Boston, Massachusetts. A full-color crossword puzzle that is filled in by competing teams, **Compuzzler** requires each team to beat a clock as they take their turn, immediately removes errors from the grid, scores points for correct words, allows one team to challenge the entry of another and guarantees group participation.

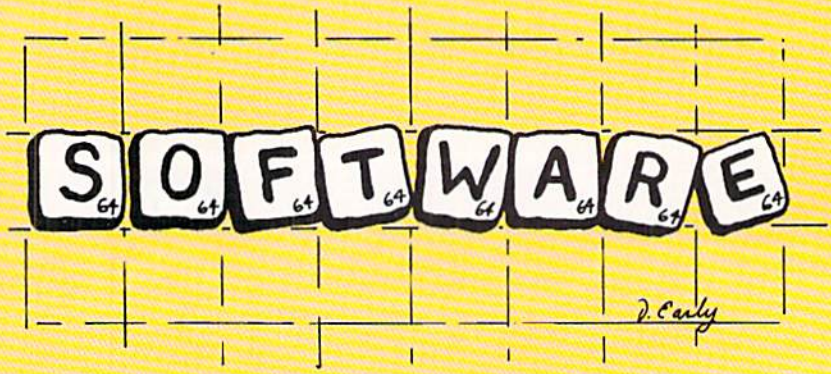
**Double Crostic** is another crossword puzzle game by Uptown Software. This game adds advanced computer features to the original by giving isolated clues to complete words and transposing letters at seemingly random locations.

## Commodore Association Plans 1985 Convention

The West Coast Commodore Association will hold a two-day exhibition in San Francisco that will feature software and peripheral vendors and noted speakers exclusively for the Commodore 64 and VIC 20 market. The convention will be in early February of 1985, after the January Consumer Electronics Show, to allow the software vendors the opportunity to test their new software products on the consumers. For more information, contact the West Coast Commodore Association, P.O. Box 210310, San Francisco, CA 94121. (The telephone number is 415-567-5046.)

## Scrabble Software

Epyx, a Sunnyvale, California, software publisher, has released **Monty Plays Scrabble**, a computer version of the popular word game Scrabble. The software plays exactly like the original game except you don't need a human opponent. The game provides four skill levels and a playing vocabulary of over 12,000 words. It accommodates three players.



# Video Acquisition System

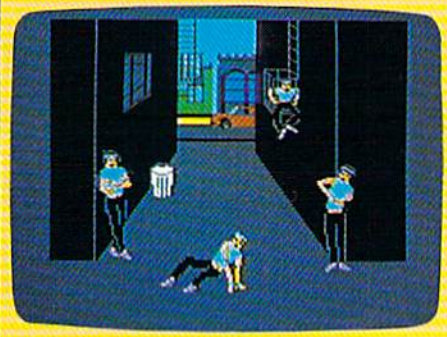
**Computereyes produces a digitized image in less than six seconds.**

Digital Vision of Needham, Massachusetts, announces the introduction of Computereyes, the company's low-cost video acquisition system for the Commodore 64.

Computereyes is a slow-scan device that plugs into the Commodore's User I/O Port and connects to any standard video source (video tape recorder, video camera, video disk). Under simple software control, a black and white image is produced in less than six seconds. A multi-scan mode also provides the realistic gray-scale images.

Some applications include: pattern recognition, security, quality control, spatial measurement, robotics and artificial intelligence, industrial controls, computer art, education and entertainment.

The Computereyes package includes interface module, complete software support on disk, owner's manual and a one-year warranty. A complete system including Computereyes and a video camera is also available from Digital Vision.



**Your dancer can moonwalk, do head spins—and more—in Creative Software's *Break Street*.**

# Break Dancing

Creative Software of Sunnyvale, California, has released **Break Street**, the break dance game for the Commodore 64 that includes street gymnastics, mime and funk. Using either a keyboard or joystick, players manipulate the break dancer through antics such as head spins, the moonwalk, snaking and the tut. Each break dance movement has its own level of difficulty and players challenge one another to dance duels.

# Everything You Can Do with Your Commodore 64

Alfred Publishing of Sherman Oaks, California, has released the book **Everything You Can Do with Your Commodore 64** by Richard G. Peddicord.

The book includes illustrations, charts, tables, photos, step-by-step instruction in word processing, electronic spreadsheets, record keeping, finance and accounting, games, education, music, graphics and communications. It also contains product reviews, recommendations on purchasing peripherals and an appendix which features a product directory with names, addresses and phone numbers of Commodore software and hardware manufacturers and their products. A directory of 64 User Groups is also included.

*More News on pg. 121*

# COMMODORE MAKES SOFTWARE FOR EVERY MEMBER OF THE FAMILY.

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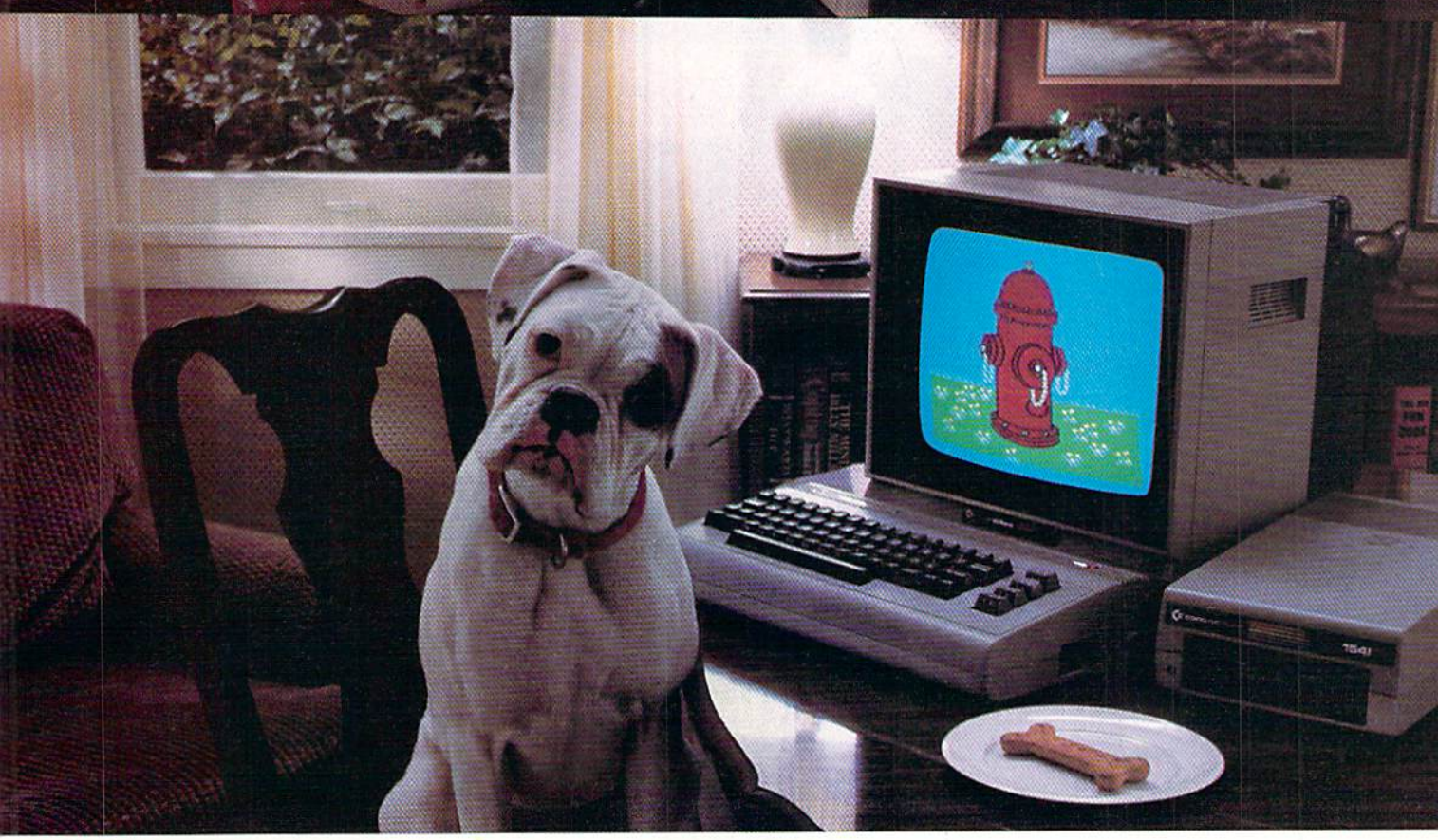

# ALMOST.

database system with four built-in filing applications. Or you can design your own.

Why, in the lower right hand corner, there's even a... oh, we don't make that one yet.

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**COMMODORE 64**

IT'S NOT HOW LITTLE IT COSTS, IT'S HOW MUCH YOU GET.

BY JIM BUTTERFIELD

# Notes Toward Creating Better Programs Part 2

*One of the world's leading experts in Commodore computing offers a few simple programming suggestions. Part 1 appeared in the December/January issue.*

## Output

PRINT generates all output. It might go to the screen, to the printer, to a disk or tape file, or to other interfaces such as a communications line.

No matter how your PRINT statement reads, your output will always be eight-bit characters. PRINT 6+7 will output the value 13. On PET/CBM units prior to 4.0, it will also output a linefeed.

Do not use comma punctuation or the TAB function except when printing to the screen. Even then, it's best to avoid these because as your program develops, you may want to redirect output to a printer or a file.

Instead, use string functions to arrange things in columns. To left-justify a name N$ within a ten-column area and then right-justify a value V in six columns, you would write coding similar to:

```
PRINT LEFT$(N$+"          ",10);
RIGHT$("          "+STR$(V),6)
```

The concatentation in each case provides the "filler" spaces. Then the string functions chop the output to the desired size. Don't forget that spaces can be pre-defined (S$="") to save space and time.

When outputting to disk and printer, you must avoid the linefeed character. On the 4.0 PET/CBM, VIC 20, and Commodore 64, this happens automatically if you pick a logical file number less than 128. On early PET/CBM systems, you must end each PRINT# line with the sequence ;CHR$(13); (do not forget the semicolon at the end).

## Numbers in Columns

The following subroutine converts a value into a string of fixed length. The user should set V1 to equal the number of characters to be printed before the decimal point and V2 to equal the number of characters to be printed after. V1+V2 should not exceed nine; BASIC's numeric accuracy starts to fall off at this point.

See Listing 1 below.

If the number is too big to fit, you'll get a string of asterisks instead of a wrong number.

The following program may be used to test the above subroutine. It prints each number in three different formats:

See Listing 2 below.

## Flowcharting

"Conventional" flowcharts are no longer favored for the development or documentation of large programs. They are still good for showing intuitive concepts such as loops and decisions, but for real programming tasks they tend to get the programmer bogged down in excess detail. Subsequent program modifications would call for massive flowchart revision, an unproductive task.

New charting methodologies are now in use. Some are keyed to programming structure considerations ("structured", "top-down", and "GOTO-less" programming). One such is the Nassi-Shneiderman diagram. (Reference: I. Nassi and B. Shneiderman, "Flowchart Technique for Structured Programming," ACM SIGPLAN Notices 8,6, August 1973). See Figure 1.

## Simple Key Tricks

Well known: The RETURN key takes the cursor to the start of the next line, and executes whatever action is indicated on the previous line: enter a new BASIC line, perform a direct command, or nothing. As the cursor goes to the next line, it drops all special printing modes such as RVS or programmed-cursor ("quotes"

### Listing 1

```
50000 REM 'USING' ARRANGE IN COLUMNS
50010 REM V IS VALUE; V1.V2 POSITIONS
50020 V4=INT(V*10^V2+.5)
50030 V$=RIGHT$("[SPACE7]"+STR$(V4),V1+V2+1)
50040 IF V2<1 GOTO 50080
50050 FOR V5=V1+2 TO V1+V2+1:IF ASC(MID$(V$,
      V5))<48 THEN NEXT V5
50060 V6=V5-V1-1
50070 V$=MID$(V$,V6,V1+1)+LEFT$(".00000",
      V6)+MID$(V$,V5)
50080 IF ASC(V$)>47 THEN V$=LEFT$("**********",
      V1+V2+2+(V2=0))
50090 RETURN
```

### Listing 2

```
100 DATA 123,3.33333,6.66666,-45.25555,9999,
    .01234,-5678,0
110 READ V
120 V1=4:V2=0:GOSUB 50000:PRINT V$;" ";
130 V1=3:V2=1:GOSUB 50000:PRINT V$;" ";
140 V1=3:V2=3:GOSUB 50000:PRINT V$
150 IF V<>0 GOTO 110
160 END
```

*Continued on pg. 14*

# Flight Simulator II

For Commodore 64™ Computers

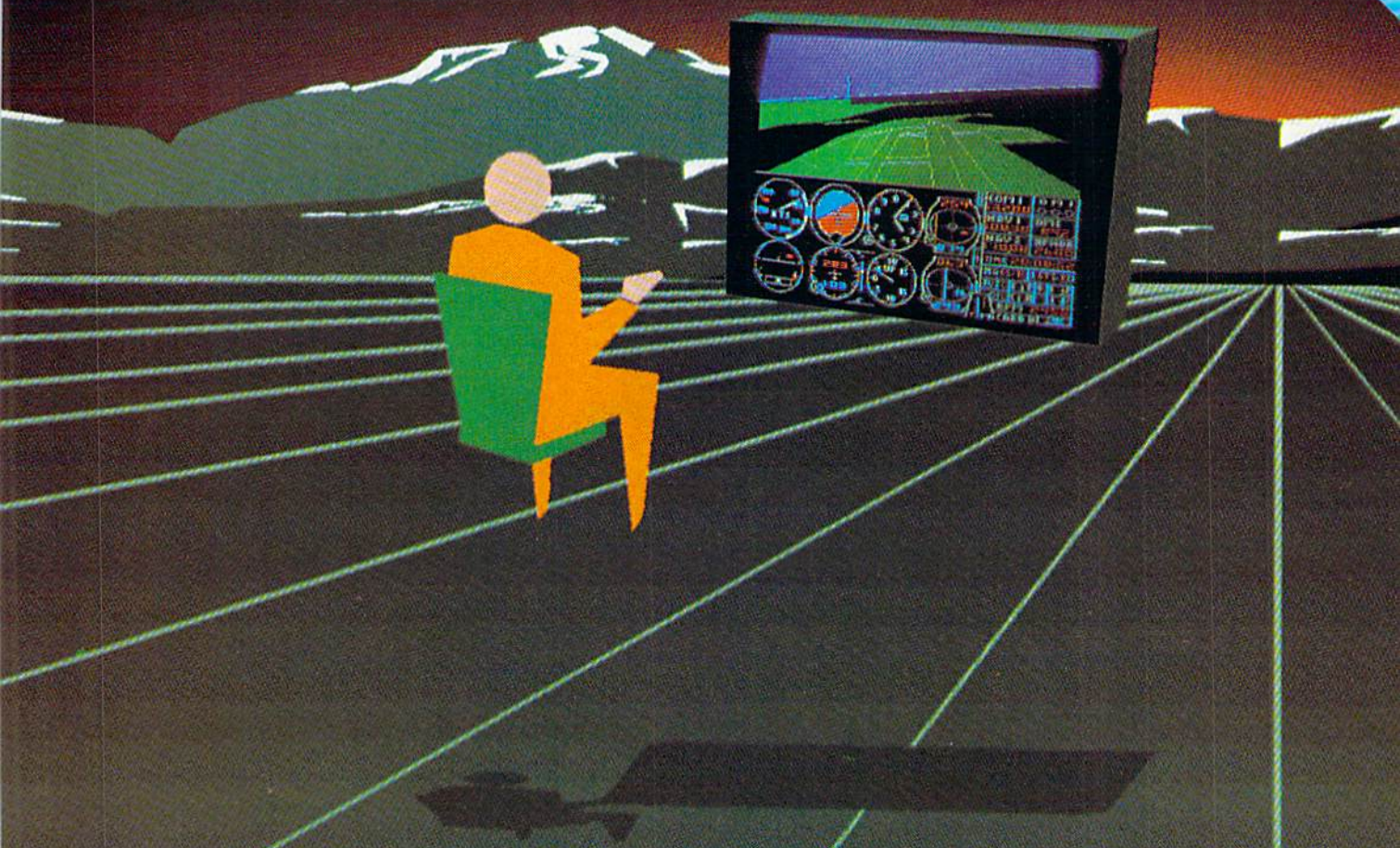

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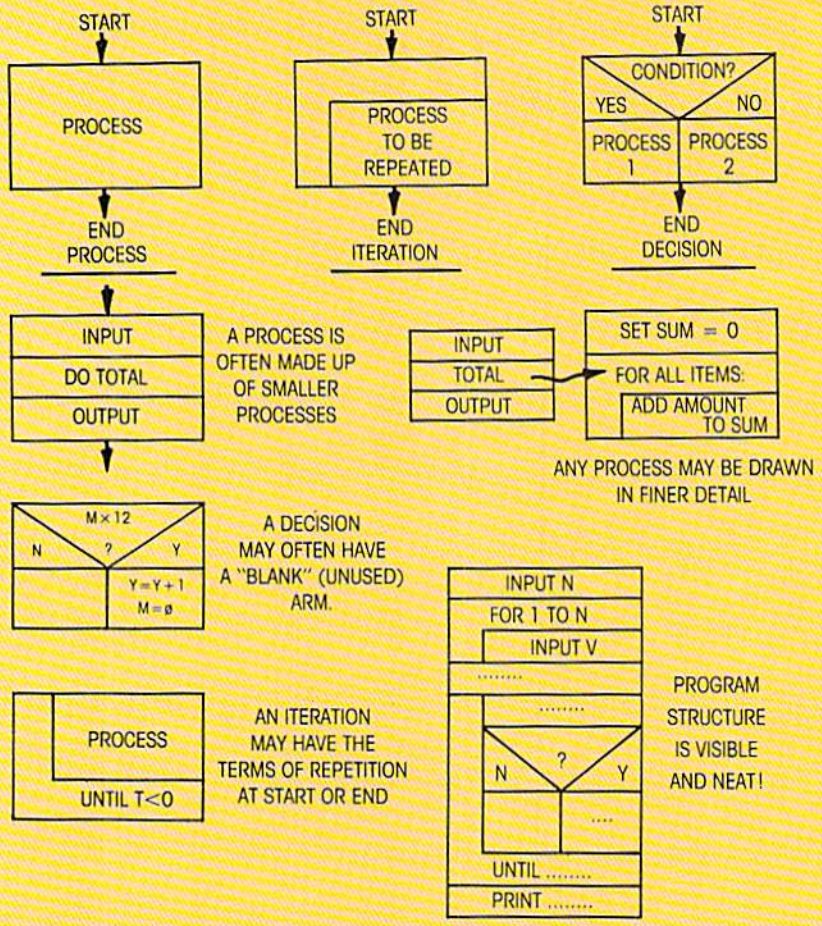
***Figure 1. The Three Basic Elements***




mode).

Not well known: The SHIFT-RETURN key takes the cursor to the start of the next line, but does not perform any action from the previous line. All special printing modes are dropped.

Why it's useful: The screen may be used as a notepad or sketch pad. As each line is completed, SHIFT-RETURN will take the cursor to the next line without a syntax error or similar message. And if an existing program line is being edited on the screen and the programmer botches the job (usually by getting into programmed cursor mode), pressing SHIFT-RETURN will exit cleanly to the next line, without entering the badly edited line into memory.

Well known: The SPACE key prints a space when pressed.

Not well known: The SHIFT-SPACE prints a character identical to a space onto the screen; but it isn't a space and won't behave like a space when entered.

Why it's useful: Typing a single SHIFT-SPACE immediately behind the line number of a program line causes following SPACE characters to be retained. Thus, a program can be given indentation. Without the SHIFT-SPACE, the indentation will disappear when the program is listed.

Well known: We may write a PRINT statement which contains cursor movement and color control characters; these show up as coded reverse characters.

Not well known: The same characters may be assigned to a variable and used when needed. They don't need to be printed right away, or ever for that matter.

Why it's useful: We can form "canned" string variables containing cursor movements. When printed, they can do useful jobs on demand: position cursor, draw a figure, or both. After GET, they can test if a certain key has been pressed, e.g., the RVS key, or a function key. Even function keys have reverse-font codes.

## Go With the Flow

One of the most useful things to learn is to make programs "flow" rather than hop around. A preoccupation with GOTO can be a bad habit.

Consider the following simple exercise. Given this first line:

100 A=10:B=34:C=29:D=61:E=47

. . . how would you code a following program to print the largest value among A, B, C, D and E? Beginners always start with . . IF A<B GOTO . . . and get into trouble right away. Most programmers quickly learn that the best coding is along the following lines:

```
100 A=10:B=34:C=29
    :D=61:E=47
110 G=A
120 IF B>G THEN G=B
130 IF C>G THEN G=C
140 IF D>G THEN G=D
150 IF E>G THEN G=E
160 PRINT G
```

Note how the above program flows from one statement to the next. Once the principle—assuming an answer and then correcting it—is understood, it is easy to write and to read.

Review your programs for how well they flow. Use subroutines liberally; learn to use boolean variables. A good program often "leaves notes for itself." Instead of departing the flow to handle a special condition, it notes the condition and handles it when the correct place arrives in the coding.

Beginners often view a program somewhat like a road map—where you are represents what decisions have been made recently. More experienced programmers view it like a passenger train—you may pick up a different set of passengers on each trip and may skip some stops along the way, but it's very seldom that you'll go off onto a spur line or siding. **C**

# TAKE A BREAK!

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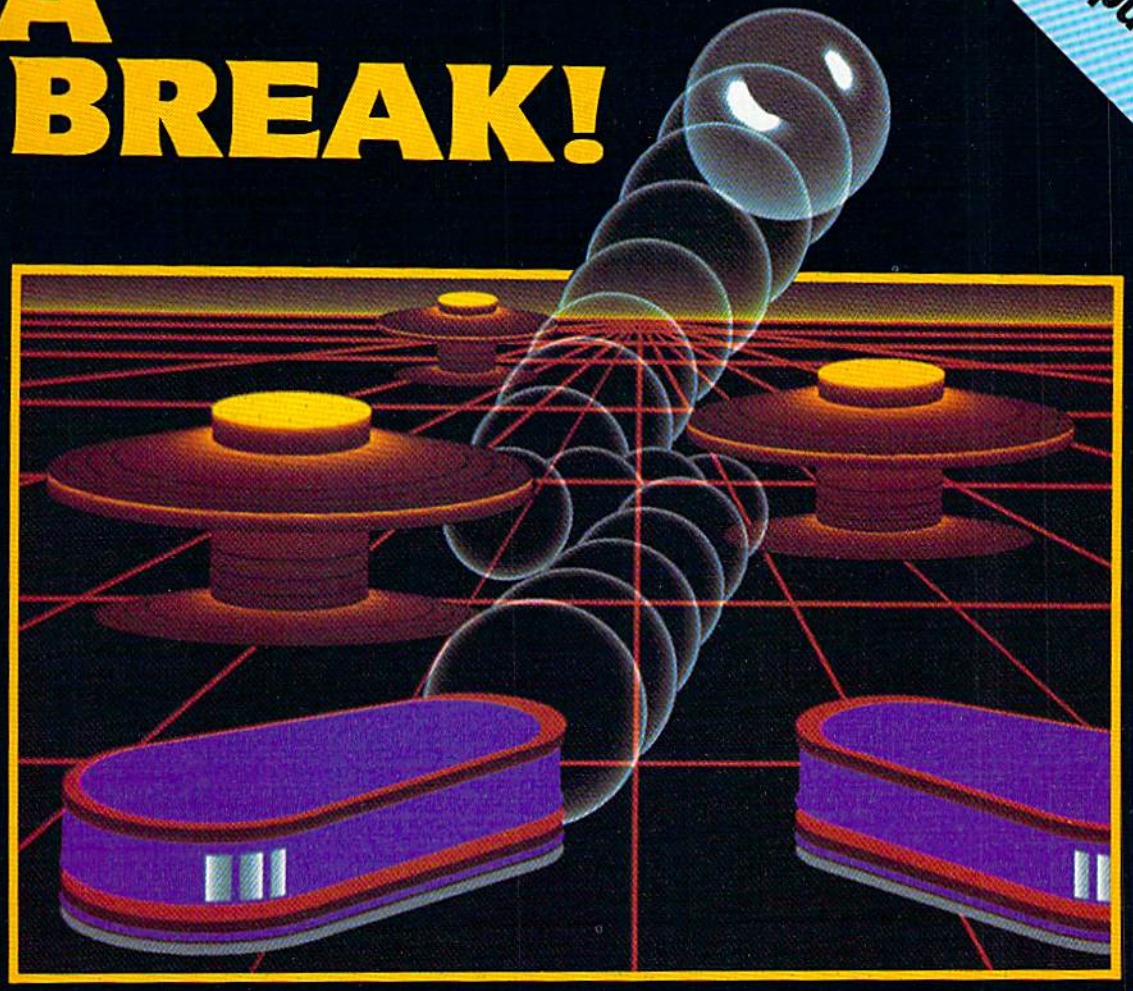

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REVIEWED BY HOWARD MILLMAN

# Space Taxi

**Computer:** Commodore 64
**Publisher:** Muse Software
347 N. Charles Street
Baltimore, MD 21201
**Medium:** Disk

*Huge magnets and black holes pull you toward sure destruction, electric interference fields propel you ever closer to doom or lasers trap you in a lethal crossfire.*

When I was a young man—quite some time ago, thank you—my father drove a cab in Brooklyn.

Many a night I remember him grousing about stingy tippers, stalled traffic and soaring tempers. These were just commonplace concerns; never once did he contend with shooting stars, alien force fields or deadly lasers. But that was thirty years ago. Now things are different, thanks to the captivating magic of *Space Taxi*.

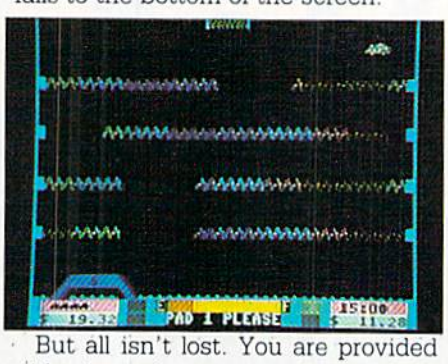
This ingenious game from Muse Software heralds a trend in home entertainment software. Its fast pace combines with first-rate color graphics and sound effects to provide superior noncombative entertainment. And what sound effects—it actually talks! True, the syntax isn't particularly picturesque, but who expects to hear the king's English in an alien galaxy anyway.

*Taxi*'s central theme casts you as a space-hopping cab driver. You're hailed by a husky-voiced fare calling out, "Hey, Taxi". The raspy, yet recognizable shout doesn't belong to a three-pack-a-day bruiser, but to a small animated figure waving for your attention. And so starts the adventure.

Since time is money and you're an experienced space jockey, you blast right over to your fare at full throttle. But beware of the many dangers lurking in these alien landscapes.

Huge magnets and black holes pull you towards sure destruction, electric interference fields propel you ever closer to doom or lasers trap you in a lethal crossfire. There's shifting terrain, asteroid barriers, invisible minefields and shooting stars. If dodging these dangers isn't enough to fret about, you also can't touch any solid object except to land. Fortunately, all this isn't happening at once, but even contending with these perils one at a time—it's still a tough way to make a living. Naturally, your fare either hails you from or wants transportation to, the other side of whatever risk is in vogue.

There are 25 separate screens. Each represents an amusing new challenge to your skill while making it increasingly difficult to get your cab from here to there. When the inevitable encounter occurs, your taxi explodes into colored dots and, accompanied by a sinking whistle, falls to the bottom of the screen.

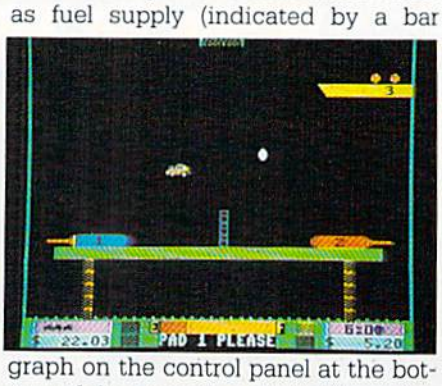



But all isn't lost. You are provided with six taxis one at a time to help you survive all these astral terrors. Some of the hazards are so cleverly fiendish, you will certainly need all six and maybe more. Why? Let's take a typical ride.

Assume that you reach the pickup spot safely and, in the advanced screens, that's an accomplishment by itself. Let's also assume that in the process, you didn't land on or incinerate your fare. The commuter walks over, climbs aboard and with the same synthesized voice, states his destination. In true spacer style, the destination is a pad number, actually just numbered flat spots usually located in some almost inaccessible chasm or planetary niche. Upon arriving, the passenger exits, walks to the pad's edge and conveniently dissolves. After a moment, a distant new figure shouts out to be picked up. This all appears and could be rather simple except you do not have precise control of the taxi's movements. Here's why.

All movement is controlled entirely by joystick. Changing direction results in a mini exhaust blast impelling the taxi across the screen. But there are no brakes. After accelerating, the taxi doesn't stop dead in its tracks, but tends to coast a bit, how far depending upon how fast you were travelling. And it's almost impossible to stay put. Unless under power, the cab slowly sinks. It's like driving a car on quicksand with a rubber steering wheel. Overcoming these realistic, but often fatal, features requires skillful coordination. Maybe more than most casual players can muster.

A few more added elements enhance the game. Practicalities such as fuel supply (indicated by a bar



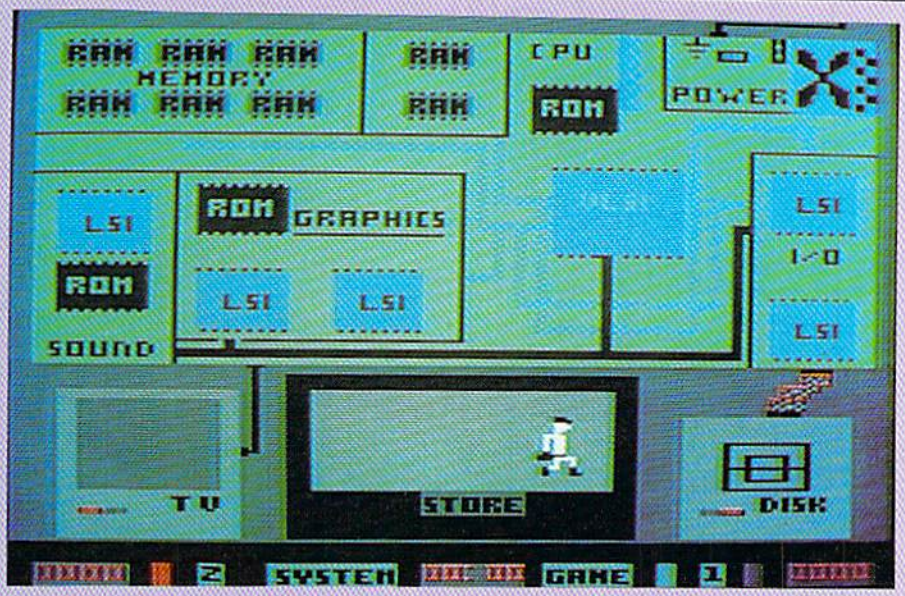

graph on the control panel at the bottom of the screen), a digital tip meter that starts decrementing from the moment you're hailed and stops when your passenger is safely delivered and a control light that flashes blue when your airspeed is slow enough to safely land are included.

Scoring is simple. You are awarded

REVIEWED BY PETER DEAL

# D-Bug

**Computer:** Commodore 64
**Publisher:** Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
**Medium:** Disk




What would it be like to take a trip inside a computer? If you have always wanted to "see" how a computer works, *D-Bug* is for you.

The program begins with a simple game which is interrupted by garbage sounds, bad graphics or other such catastrophe. You are transformed into Moe Dem, Dot Matrix or MAX (Mechanical Antibug X-pert) the robot, and it is up to you and Charlie Fixit to bring the computer back into flawless operation. You can travel anywhere inside the computer in your search for trouble spots.

The screen is divided into chip sections which flash if there is a "bug" in them (easy levels). Once inside a section, you can move over the chips to push them in or check if they are hot or defective. On the harder levels, the chips don't flash, so diagnosis is that much harder.

*D-Bug* has graphics so detailed that you are able to see the little legs on the chips, fuses, fan and filter. The music is only acceptable, but the sound effects are superb. The manual is thorough and contains everything you need.

I highly recommend *D-Bug* to anyone who wants an insight on the inner workings of a computer. At the same time, you can strengthen your problem-solving skills. C

$5.00 for every ride successfully completed, an extra $10.00 if your fare requests to be delivered to another screen, plus the amount of the tip shown on the decrementing meter, assuming the meter hasn't reached zero. Earning any amount over $50.00 entitles you, accompanied by a suitable musical fanfare, to list your name in the cabbie's hall of fame. Entering your name, incidentally, is one of only three actions requiring keyboard use

since the game is played almost exclusively with a joystick. The other two are freezing the action when it's time to take a breath or exiting the program at any time. Single keystrokes are all that's required, so anytime a new screen is offered, you have to play or pass.

As many as four cabbies can play using the same joystick. You are initially offered a choice of five various shifts: Morning, Afternoon, Night, 24-hour or Random. The shifts are the difficulty levels.

In the Morning (easiest) mode, the first screen, entitled "Short and Sweet," requires picking up and delivering from one to three fares. On all screens, when the last fare calls, "Up Please," you ease the taxi through a narrow break in a force field at the top of the screen. That in turn earns you an extra $10.00 and takes you to the next progressively harder screen entitled "The Beach". Here too, you are required to pick up and deliver additional fares while dodging an increasing number of challenging obstacles. Your last fare says, once again, "Up Please," and so it goes. But not for me.

So far I've not passed the fifth screen, because the complexity significantly increases with the introduction of moving hazards. The overriding challenge, once again, is in smoothly controlling the movement of the taxi.

Aside from the creative theme, the most intriguing aspect of *Space Taxi* is the voice. The vocabulary is unquestionably limited: "Hey Taxi," "Pad—Please," "Up Please" and a very annoyed "Hey!" when you accidentally land on your fare. The gruff hoarse voice comes through clear enough to understand but the message is also printed below on the control panel for easy verification. All the graphics and animation are excellent as are the standard sound effects.

The program also contains a demonstration mode which runs through four screens, illustrating exactly what perils await in each. Exiting the demo mode is accomplished by simply pressing the RUN/STOP key. As an enjoyable, even spellbinding, introduction to this amusing program, sit back and let the demo automatically run. Since the manual does not explain each screen's hazards, the demo mode is instructional as well as entertaining.

If I were to fault the program for any shortcomings, and nothing is really ever perfect, I think that surviving some, if not most, of the hazards is almost impossible. Perhaps, when it comes to being a space cabbie, I just don't have enough of the right stuff.

Next week my father gets his turn and then I'll know for sure. C

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# GAME REVIEWS

REVIEWED BY IAN ADAM

## Oil's Well

**Computer:** Commodore 64
**Publisher:** Sierra
Sierra On-Line Building
Coarsegold, CA 93614
**Medium:** Disk

This fast-action game leaves even the spectator thoroughly captivated. Although *Oil's Well* may have started out as a simple offshoot of the usual maze-game theme, it picked up a life of its own along the way.

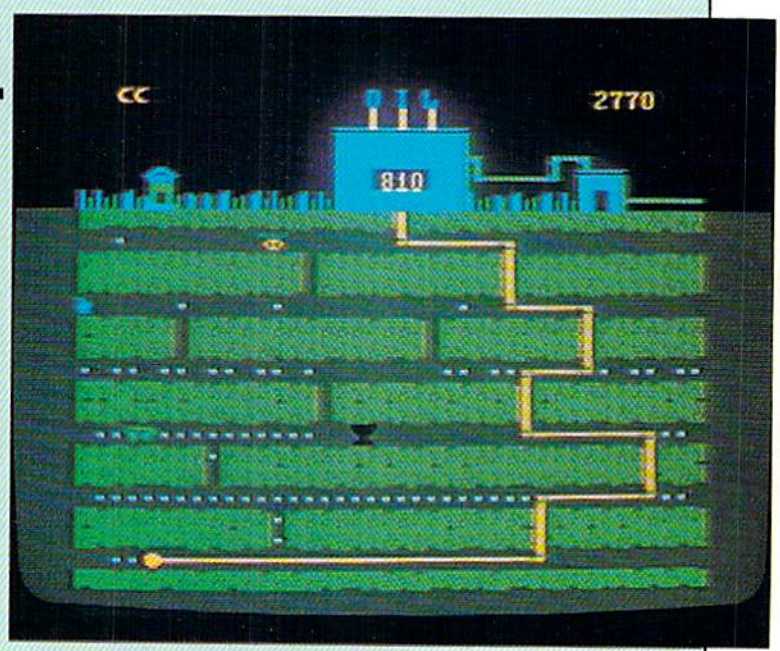
The concept of *Oil's Well* is simple—you are drilling for oil. First, you choose one of three levels of difficulty (regular, unleaded or premium). Then you use the joystick to maneuver your drill bit through a series of underground passages. (The drill bit bears a strange resemblance to that well known packrat of the mazes.) As it moves underground sucking up oil, however, the bit drags around a "tail" of drill pipe. It is this drill pipe that makes the game so interesting.

You see, beneath the ground lies a wide variety of hazards. There are ferocious meanies that will attack your pipe, unless you can get to them first with the drill. There are also bombs (placed by a competitive oil company) that attack the bit but ignore the pipe. There are dead ends to avoid and bonus points if you can keep moving. When all the oil has been drained, you pull up stakes (just like the real oil companies) and move on to a new well with a more complicated maze. As each screen is completed, you build another piece onto your refinery; after eight screens, the refinery is complete.

The most fascinating part of the game is the protection of your drill pipe. As you move through the maze, the pipe becomes longer and longer. It takes a good deal of coordination to protect your "tail." Try to keep moving and scoring points for as long as you can, of course, but when trouble is imminent, press the fire button and the drill pipe will retract, dragging you back to safety at the top of the well. Helplessly watching it reel in while the meanies converge upon you, all the while hoping that you didn't leave too late, is true suspense.

During all this, a clock is counting down at the top of the screen. If you don't drain the well of oil by the time it reaches zero, you lose one of your three drill bits.

The squeaky noises, wide variety of demons and excruciating mazes will keep you occupied for hours. The game draws heavily from *Pacman*, yet the added dimensions result in a product that I find more enjoyable; one that just may well hold its entertainment value longer. C



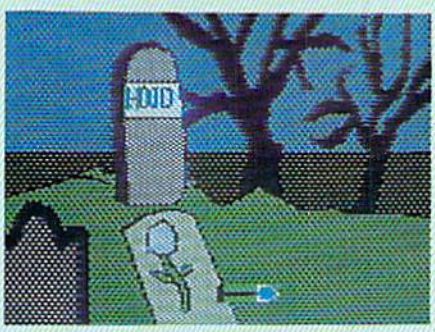

*When all the oil has been drained, you pull up stakes and move onto a new well with a more complicated maze.*

REVIEWED BY MICHAEL BURNS

# Death in the Caribbean

**Computer:** Commodore 64
**Publisher:** MicroFun
2699 Skokie Valley Road
Highland Park, IL 60035
**Medium:** Disk

*High-resolution screens, text descriptions and a map of the island help you progress in this graphic adventure game.*



*Death in the Caribbean* is a graphic adventure game in which you are a treasure hunter exploring a desert island, all the while avoiding potentially fatal pitfalls. High-resolution screens, informative text descriptions and a map of the island are included to help you chart your progress. The map illustrates the paths on the island and all of the major landmarks, which include an old church, a bottomless crevasse, an upside-down pyramid and Voodoo Cave. The only area not mapped out for you is Voodoo Cave; that you must do yourself if you reach it. Also, the map does not show you specifically where any of the objects that you need to find for protection are located.

Changes in position are accomplished by the touch of a key. Any of the four compass directions or the "L", "R", "F" and "B" keys (left, right, forward, backwards) can be used to move around the island. If there is no path in the direction you want, the program will simply inform you that a path does not lead in that direction. If there is a path, the program will load and present a graphics screen along with a text description of the new location.

Because of the memory requirements of the screens, *Death in the Caribbean* is contained on both sides of two disks. Insert the correct disk and side at the appropriate time and press the space bar. The next screen will automatically load. The insertion of a new side of a disk occurs at two natural land divisions—at the cliff and river and at Voodoo Cave.

Two of the most unique features are an unpredictable ghost and the ability to save your game in progress. While playing *Death in the Caribbean*, a ghost will occasionally fly across the screen and try to steal your weapons. To offset the effects of the ghost, you can save your game at any point. This allows you to save those games in which you have not lost many weapons. Also, since each screen takes about 15 seconds to load, the save feature will save you a lot of time in retracing your steps.

The only drawback of *Death in the Caribbean*, other than the load delay and the pesky ghost, both of which can be minimized by using the save feature, is the absence of any sound. Personally, however, I've grown accustomed to screen-loading type games and as for the sound, I don't think I could stand listening to a sound menagerie during the long hours spent laboring over the solutions to some of the screens. On the whole, *Death in the Caribbean* is a great game that will keep you occupied for hours.

## Survival Kit
## Tips for the Novice

Carefully study both the high-resolution screens and the descriptions of them. Sometimes an item will be shown on the screen but won't be mentioned in the text description.

For example, frequently you will be placed at an intersection facing in a direction you would not expect. This happens to save memory space; only one high-resolution screen was made for each intersection. To lessen confusion about what direction you are heading, use compass directions. This is especially true when investigating Voodoo Cave where the only directions given are compass headings.

The text description is very important, not only because it informs you of the direction you are facing, but because it may also give you hints after you have died. For instance, after dying at the anthill, you may receive this message: "The hole was not covered. The ants got you." Now you know that you have to "cover" the hole with something before you can pass by it.

The wagon is at the end of a path in the first section. However, the path is not shown on the map. Without the wagon, it is possible to carry only four items at a time. But don't forget that you can wear some of the items; an item you are wearing does not count as one that you are carrying.

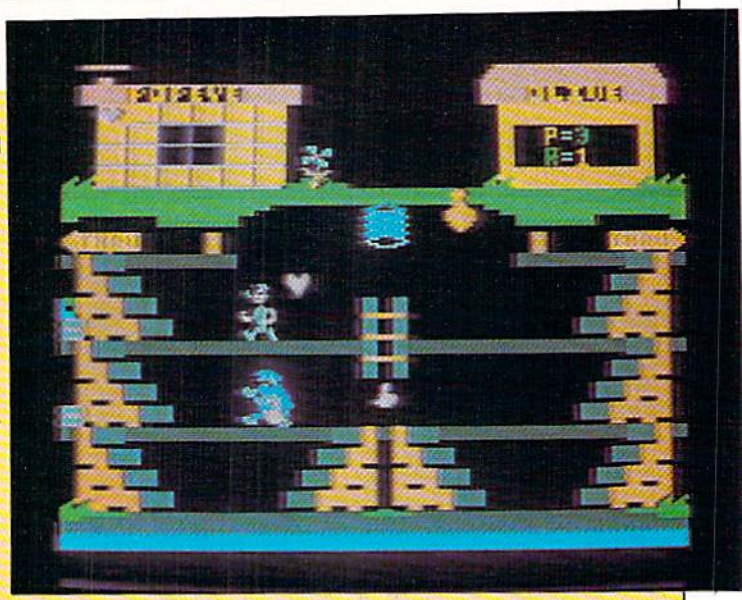
One last hint: when you enter Voodoo Cave, a match will stay lit for three commands before going out! C

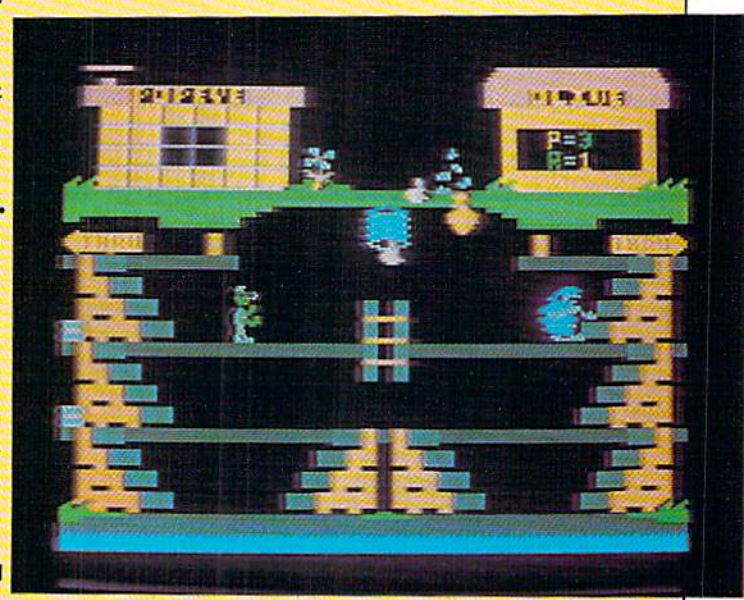
REVIEWED BY MARK COTONE

# Popeye

**Computer:** Commodore 64
**Publisher:** Parker Brothers
50 Dunham Road
Beverly, MA 01915
**Medium:** Disk

*He has a chronic wink, a honeydew head and oversized, drooping jowls. His forearms are larger than his biceps and his ever-present corn pipe rarely burns. He is the homeliest, yet, perhaps the most loved, cartoon hero of all time.*





Last year, *Popeye*, Nintendo's original arcade game based on Segar's characters, appeared and quickly captured a monster portion of player popularity. Parker Brothers, realizing the appeal of the contest, recently translated the hit for the Commodore 64. And credit is due to all of the anonymous designers, for this program captures all the charm, excitement and challenge of its coin-op counterpart.

Anyone familiar with Popeye cartoons or comics will immediately recognize the game's theme. Popeye loves Olive Oyl, Olive Oyl loves Popeye and the local bully Brutus is crazed with jealousy. All this is wrapped around a game structure that is a brilliant cross between the gobbling-maze format and a climbing contest.

Each of the three different screens is comprised of four platforms on which the characters move about. Olive stands atop these various stairway-connected ledges and tosses her tokens of affection down to the joystick-controlled Popeye. He then must move from side to side, climbing and descending steps to catch these objects, while avoiding the emotionally-confused Brutus and his envious comrades. If Popeye seizes all of Olive's offerings, he wins her adoration and continues onto the next level. But he can be foiled in three different ways.

First, if any of the falling keepsakes reach the bottom of the screen and sink into the water below, Popeye forfeits Olive's devotion and dies (of a broken heart, I suppose).

Brutus's touch must also be avoided. A mere tap from this blubber ball will send your Popeye to a quick burial at sea. Don't be fooled, this browbeating attacker may be obese, but he's also fairly agile. Although he won't jump from ledge to ledge like the nimble double of arcade fame, he is limber enough to leap at Popeye's feet should you try to pass from above or squat and swat him if you loiter below.

Finally, death may knock with an empty beer bottle. Throughout the game, Brutus and his despicable partner, Sea Hag, will try to pelt Popeye with their drained nonreturnables; an appropriate title for these unusual weapons. One shot and it's lights out.

But Popeye also has a few tricks up his short sleeves. He is the fastest of the onscreen characters, which will allow for some skillful fleet-footed maneuvers if the situation becomes less than comfortable. And he is allowed to jump down any number of ledges without harm, a useful trait when escaping his lumbering enemy.

Also, our sailor packs his famed punch. A press of the fire button will cock and release a blow, enabling your player to break oncoming bottles or grab an evasive can of spinach. This vegetable acts as a power pill, turning Popeye green and allowing him to taste revenge by pulverizing Brutus. But this metamorphosis is short lived and before you'll be scampering back to a defensive style.

Because of the variety of possible player strategies and the randomness of the computer-controlled obstacles, this game is fast moving, virtually patternless and destined to become a "let-me-try-just-one-more-time" classic.

One could not imagine Parker Brothers matching the incredible animation of the arcade version, but they do come close. Each character moves



*Continued on Pg. 22*

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# GETTING YOUR SEA LEGS
## *HINTS FOR THE NOVICE*

- The maximum number of descending tokens which will appear on the screen at the same time is seven. Try to grab your spinach only when the onscreen objects approach this amount. This will allow you to take full advantage of your temporary character change, which includes double point value for all touched tokens.
- If two Sea Hags appear simultaneously at opposite ends of the same platform on which your Popeye is currently stationed, move away from the screen's center. When both baddies unleash their bottles, you want to be able to bash them one at a time. If you were caught in the middle, you would be faced with the dilemma of two projectiles reaching you at the same time; a losing situation at best.
- Through-ledges are incorporated in the first and second screens. They allow you to wrap-around; that is move off either edge of the screen to reappear on the opposite side. No other character is given this privilege, so you can use this tactic to draw Brutus away from an area you would like to work in.
- On the Sweet Heart screen (Round #1), you will notice a small punching bag located near the center, topmost part of the screen. Next to this is a bucket, which will fall straight down anytime the bag is hit. If Brutus is directly beneath this snare, he will be momentarily trapped, allowing free player movement around the screen. Use this device when Brutus is on the ledge directly underneath. Some players will try to gain points by attempting to nail Brutus on the higher valued lower ledges. But this situation occurs infrequently and more often than not, the pitfall is wasted or forgotten.
- On the Love Notes screen (Round #2), be wary of the possible perils of using Wimpy's see-saw. It's supposed to help Popeye in a tight situation by allowing him to spring up to higher levels. But when our sailor is rising upward, he cannot punch, leaving him defenseless if he happens to confront Brutus or a bottle. Remember, always look before you leap.
- The H-E-L-P screen (Round #3), although designed to be the hardest of the three screens, turns out to be the simplest. The setup looks intimidating, since there is no through-ledge and very limited running room. But for some odd reason, Brutus is bashful!

To conquer this round, simply move your player to the bottom ledge of the boat and wait for Olive's descending cries. Although the tokens won't be as valuable, you will remain virtually undaunted, aside from an occasional Sea Hag or a wandering vulture. It appears as if our bully has developed an acute case of hydrophobia, for he will rarely venture off of the second platform. Don't be surprised if he spends the entire round pacing to and fro on the upper ledge, oblivious of the heroics below.

*Continued from pg. 20*

smoothly and is very recognizable. The screens' backdrops and playfields are beautifully designed, with so many variables, you'll be discovering fresh nuances with each reset.

The different background tunes which accompany each screen are light and likeable melodies, which add to the game's rhythm and charm.

I especially enjoyed the visual and audio effect displayed when Popeye's spinach puts him on the offensive. The well-known theme song is cued while Brutus flees in a frenzied sprint, well aware of what's in store. And, if our hero tags him, he bounds wide-eyed from wall to wall before his final splashdown at the screen's base.

*Popeye* is highly recommended for arcade lovers of all ages. The younger audience will adore the cute characters, easy to follow documentation and buffered violence, while the seasoned arcader will enjoy the rapid-paced comical challenge in a contest that tests you from the start and remains, as its namesake would imply, strong to the finish.

**C**

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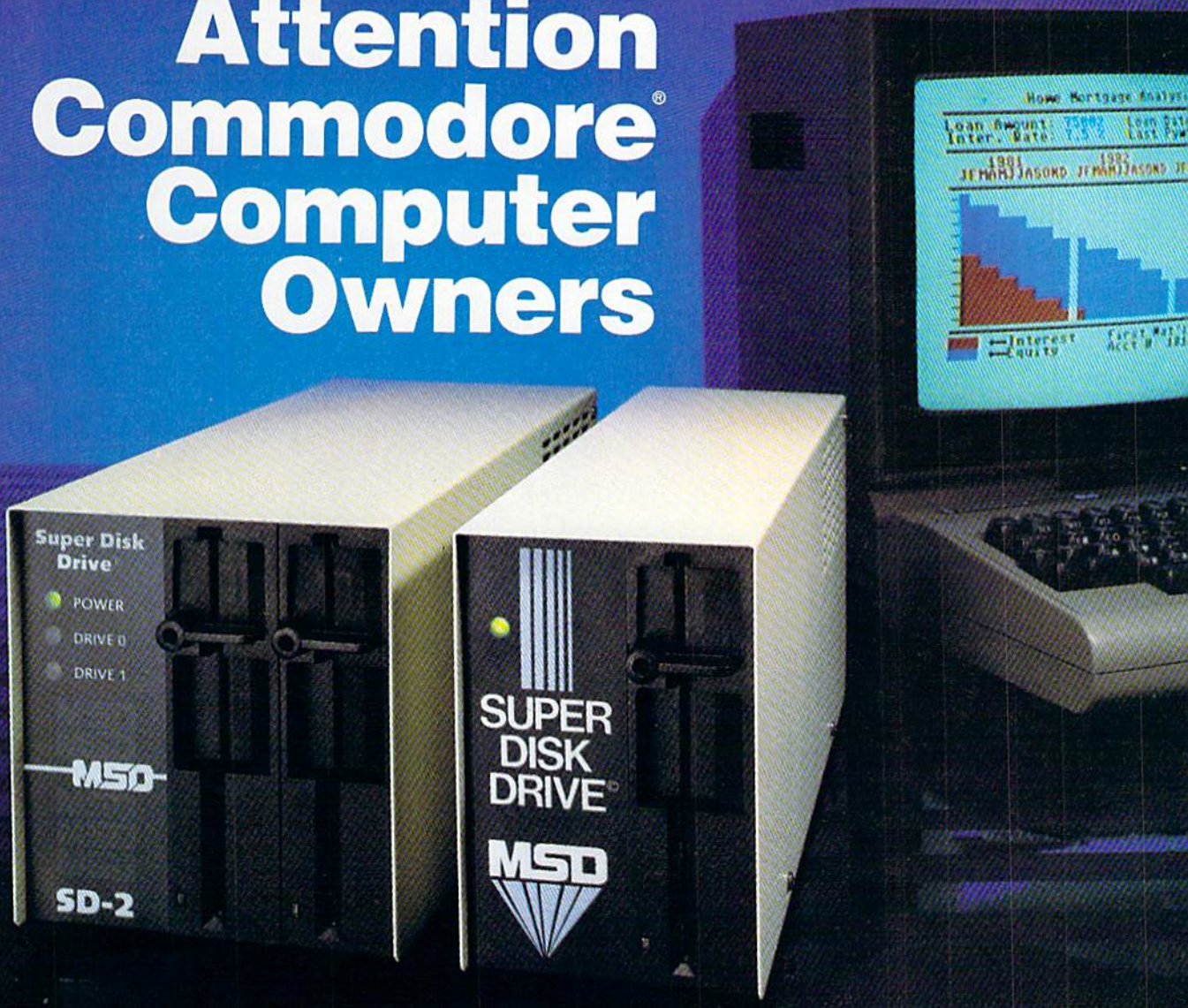


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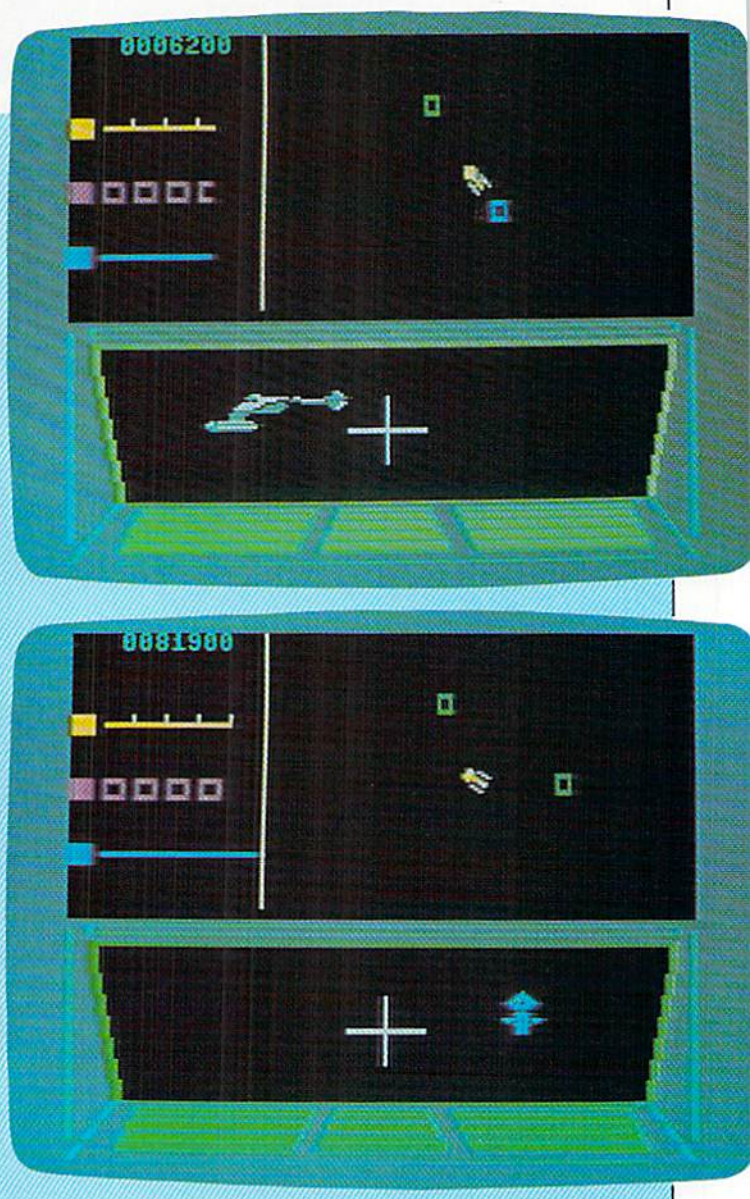
REVIEWED BY MARK COTONE

# StarTrek

**Computer:** Commodore 64
**Publisher:** Sega Enterprises, Inc.
360 N. Sepulveda Blvd.
El Segundo, CA 90245
**Medium:** Cartridge

*Sega's home version of their Pay-For-Play Hit,* Star Trek: Strategic Operations Simulator, *captures all of the exciting gameplay that established the original as an addicting coin grabber.*




The contest's theme is not new. In its primary form, it's no more than another outer space blast-or-be-blasted. But this recipe for success takes this leftover subject matter, mixes in some imagination with a pinch of novelty and creates an attractive program that would be a welcome addition to any computer's library.

Much of the initial appeal of this match is the immediate feeling of intimacy Sega creates. By licensing the Star Trek name, they have given the game personality; where banal electric blips become familiar antagonists to anyone who has ever seen the corresponding movie or television show. This depth endowment helps pull the player into the battle, suspending his superficial disbeliefs.

The idea here is to save the Federation from its most powerful enemy, the infamous Nomad. This adversary has a nasty habit of littering the final frontier with a never-ending supply of deadly mines, making travel unsafe for any space vehicle. Your assignment: venture into this explosive field and pulverize this elusive fiend without destroying yourself. It's a tough job, even for a seasoned pilot.

There are ten levels of progressive difficulty, consisting of five rounds apiece. The Nomad confrontation occurs during the final segment of each level. To get there, you must first fight off four squadrons of various marauding Klingons.

Some noteworthy designer innovations are apparent in the two outstanding features; one onscreen, the other in-hand.

The latter is a device called a Combat Control Panel. This sturdy plastic overlay fits snugly on most standard joysticks and is intended to orientate the novice captain with the Enterprise's navigational functions. Although most players will find these controls easy enough to remember after a minimal number of plays, it's nice this creative approach to instructing.

The second fresh idea is in the structure of the game screen itself.

To reign as victor at the helm of your Starship, there are several factors you must constantly monitor. Sega, with a design that will surely become the standard for future games of this genre, has developed a split screen viewing system, allowing you to keep tabs on all of your ship's vitals simultaneously.

In the upper left portion of the screen are your gauges. These track your score while minding the Enterprise's defenses and weapons.

The top right section houses your overhead radar, enabling you to check your position in relation to the Klongon vessels and your Starbases, where you can revitalize all your drained energy supplies.

Finally, stretching across the entire bottom half of your display, is a first person cockpit view of the neighboring universe. It's here where you come eye to eye with your opponents: supervising their extinction firsthand.

The instantaneous availability of all the ship's vitals quickens the pace of the conflict, calling on each potential captain to make split-second battle decisions based on this ever-changing information. This, along with the variety of enemy craft—and the randomness of their positioning—heightens *Star Trek's* playability; requiring flexible strategy with each



*Continued on Pg. 26*

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# GAME REVIEWS

*Continued from Pg. 24*

reset.

And lest anyone think that this contest is simply a cerebral exercise, one game will quickly remind you that this encounter was born and raised in the arcades. Lightning reflexes, agile hands and an itchy trigger finger will undoubtedly increase your score.

Add to this the coin-op polish of tones and tunes which barrage the player and compliment the enemy onslaughts. Plus, if you're skilled enough to demolish Nomad, you'll be treated to a short computerized rendition of that familiar theme song. A true Trekkie delight.

But like all our fantasy voyages, this space trip will inevitably come to an end. Whether you are overpowered by a frantic pack of Klingon attackers or a friendly call to the dinner table, there will come a time when your joystick will be placed down and you will be forced to move from your cockpit . . . uh, I mean, chair. And this is where I would like to make my final observation.

As a young man gets older, his toys also get bigger and much harder to transport.

Does anyone know where I can get a pair of kangaroo-style jeans?

# EARNING YOUR WINGS

## AID FOR THE ANXIOUS TYRO

The four-page instruction booklet that comes packaged with Sega's *Star Trek: Strategic Operations Simulator* cartridge, dedicates a section on helpful hints to be used during your early missions. Read it over carefully; it's a solid foundation on which to build your own player technique.

Below, I've listed some pointers which expand on the tips that have already been provided.

- Klingon Encounters—There are two types of Klingon vessels and each should be dealt with in its own fashion:

*The Blue Klingon*—These cruisers will position themselves in an attempt to destroy your Starbases, ignoring the Enterprise until their task is completed. Attack these ships first. This will secure your valuable bases and help clear the cluttered battlefield as you move into your next assault.

*The Grey Klingon*—These antagonists seek to demolish your ship with Plasma Energy Orbs. After annihilating the Blue Klingons, try to draw these remaining cruisers into clusters for destruction with a solo Photon Torpedo. Or, if a single opponent is remaining, circle behind it. The Klingon ships are sluggish when trying to track you in this manner, leaving themselves vulnerable to your Phaser fire.

- When engaged in battle, use your radar screen to line up your Photon Torpedo and Phaser Strikes. The first-person viewer might be more appealing visually, but it's only use in combat situations is in fine-tuning a shot.

- Warp Drive is an overlooked weapon. The Enterprise cannot be hurt in any way while this instrument is engaged. This not only acts as a great defensive plus, but can be used in an aggressive manner—to ram opposing craft!

- Never take the time out to chase an anti-matter Saucer. Their main purpose in this contest is to distract you and they can do a good job of it. Don't be lured. Challenge them only when they become threatening to the well-being of your ship.

- The instruction booklet claims that both Klingon models will turn white and ram the Enterprise when your Starbases have been destroyed. Forget it. After dozens of hours playing this contest, that transition has yet to occur. The Blue ship will turn Grey, but it will only take on that color's characteristics and nothing more.

And, while we're on the subject, this booklet also states that, as Captain, you will have to pick your way "through perilous fields of asteroids and blazing meteors." Although it sounds like quite a challenge, I wouldn't sweat it. These space rocks are nonexistent and are never confronted in this rendition of the game.

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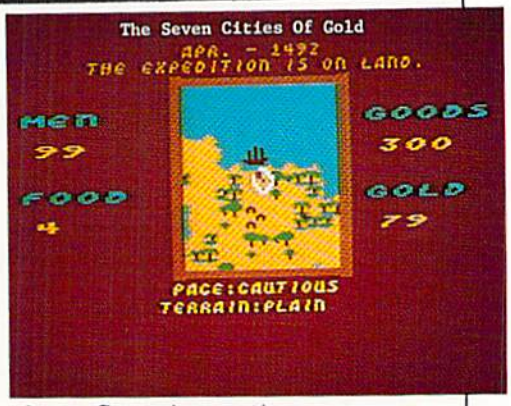
REVIEWED BY JEFF SEIKEN

# Seven Cities of Gold

**Computer:** Commodore 64
**Publisher:** Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
**Medium:** Disk

*Included in this game of exploration is a ten-page manual filled with atmosphere-setting illustrations, playing tips, historical notes and a bibliography with suggestions for further reading.*




Electronic Arts' *The Seven Cities of Gold* is set in the era of exploration and exploitation of the New World. A solitaire game, *Seven Cities* transforms the player into a Spanish explorer leading an expedition across the Atlantic Ocean into the uncharted expanse of the western continents.

*Seven Cities* comes packaged in the usual Electronic Arts double-sleeved album and features striking cover art—a reproduction of a 17th-century Spanish painting depicting a dramatic encounter between natives and conquistadors on the shores of the Gulf of Mexico. Included with the disk and reference card is a ten-page manual filled with atmosphere-setting illustrations, playing tips and historical notes. The manual even provides a bibliography with suggestions for further reading. The documentation, written in the form of advice to explorers, is generally sufficient—though purposefully vague in many areas, to reserve the joy (and frustration) of discovering the specifics for the user.

*Seven Cities* begins in Spain. In a richly colored, animated sequence, the player guides his explorer via joystick through the streets of a Spanish city toward the waterfront. For the beginning explorer, the Crown has already assembled an expedition at the quay. All that a novice explorer needs to do is board his ships and set sail.

Once an expedition departs Spain, movement takes place across a scrolling map in the center of the screen delineating an area of approximately 120 miles. A white compass represents the expedition's position on the map and direction of movement is controlled with the joystick. The computer screen also displays information concerning the status of the party (number of men, weeks of food remaining), its current environs and the month and year. Additionally, the player can transfer to an alternative screen showing latitude and a map of all explored areas within a 960-mile square.

On land, most expeditions can carry no more than an eight-week supply of food, thus limiting the distance an explorer can stray from his ships. Expeditions have three possible rates of land travel—cautious, moderate or reckless—each of which involves a correspondingly greater risk of party attrition due to disease and accidents. The local geography further affects an expedition's movement speed. In the New World, explorers stumble across all sorts of vegetation and terrain, from lush green forests to tremendous mountain ranges. Besides influencing movement, distinctive terrain features also serve as important landmarks. Since an explorer will never know more than his latitude, the use of landmarks to avoid getting lost becomes necessary. Rivers, in particular, are valuable avenues of exploration in a world devoid of roads.

Of course, the New World was new only to the Europeans and, in fact, contained the seats of some of the oldest civilizations known to man. Natives in *Seven Cities* are found only in settlements, ranging from the crude huts of simple hunting tribes to the great stone pyramids of the Aztecs and Incas. When an expedition encounters a settlement, the screen presents a blow-up of the native village. Scurrying natives appear, accompanied by an ominous background drumbeat which is an indicator of the natives' attitude. As the tempo of the drum beat increases, so, too, does the natives' hostility.

The expedition, represented by the figure of a single Conquistador, begins at the outskirts of the settlement. In order to trade with the natives, the player must guide the Conquistador across the scrolling grounds of the village and locate the native chief, who resides in the village center. However, contact between the Conquistador and any of the native figures results in the immediate elimination of the native, thereby adding to the hostility of the remaining villagers. Hostile tribes, or even simply curious ones, tend to crowd around the Conquistador. Thus, gaining an audience with the native chief often requires a bit of arcade-like maneuvering with the joystick on the player's part. To pacify the natives and open a path through their ranks, the player may also wish to dispense gifts or attempt to amaze the village with feats of technology.

Once the chief agrees to trade, goods can be exchanged for food and gold. Only by gaining food from native villages will an expedition be able to venture far from its ships without fear of running out of supplies. Native bearers may also be taken on, permitting greater quantities of food and gold to be transported. Explorers of a more martial frame of mind have a second option apart from trade that can be adopted when dealing with natives—conquest! Expeditions can take what they want from defeated native villages and can also set up



*Continued on Pg. 30*

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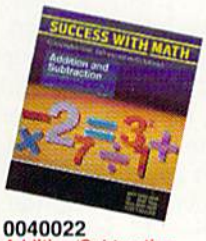


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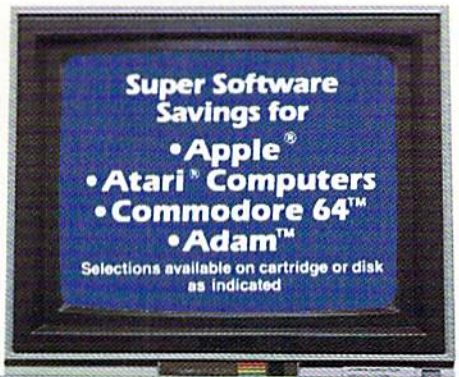

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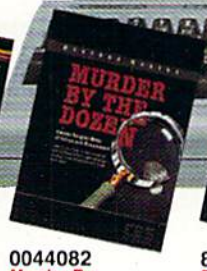


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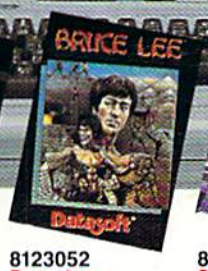


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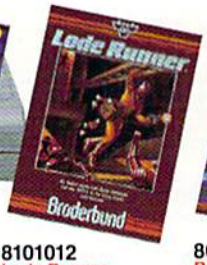


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 Continued from Pg. 28

forts and missions by leaving some men behind. The main drawback to this approach, besides the cost of men killed in battle, is that it increases the hostility of neighboring villages and makes the expedition susceptible to native ambushes.

As the name *The Seven Cities of Gold* implies, it is gold which lies at the heart of most explorers' desires. Gold can be found in villages and in the numerous hidden gold mines sprinkled throughout the New World. Native bearers will divulge the location of some mines, but the others will have to be discovered through careful exploration (and frequently blind luck). Back in Europe, gold can be used to outfit larger expeditions as well as to establish the explorer's private fortune.

Once a player feels that his expedition has accomplished enough for one voyage, he may return to Spain and to the accolades of an adoring public. There, he must pay a visit to the Palace, where the Court will rate his recent performance, bestow titles of honor upon those judged worthy, and possibly issue loans to finance further expeditions. Be forewarned, though, the Court is a harsh judge. After a voyage lasting several years in which I had explored over 33% of the New World and brought back the spoils of two rich mines, the Court rated my performance as merely fair and dismissed me from the Palace.

Once in Spain, an explorer can also visit his home, in which can be found a summary and map of all his discoveries to date, and the Outfitters, where the necessities for new expeditions can be purchased. Finally, at the Pub, a player can preserve his past discoveries (i.e., save the game) in a commendably painless manner simply by pressing a function key, waiting 15 seconds, and then—if he so desires—continue playing with no need to reboot the disk.

*Seven Cities* contains a number of features that can best be described as chrome; though not integral to the game, they do enhance player enjoyment and help create a feel for the game's subject in the player's mind. For example, as the seasons change, so does the color of the vegetation, from green to brown marking the arrival of autumn, then to white with the first snowfall, and back again to green as spring approaches. Of course, these seasonal changes vary according to latitude, too. Likewise, the amount of food available in the native villages depends on the season and the village's location. Besides the excellent graphics and animation, *Seven Cities* also makes nice use of the 64's sound capabilities, responding with the appropriate musical themes, sound effects and fanfare.

***The documentation, written in the form of advice to explorers, is purposely vague in many areas to reserve the joy (and frustration) of discovering the specifics for the user.***

Gaining a degree of proficiency in *Seven Cities* is mostly a matter of experience. However, some general do's and don't's may prove helpful. First and foremost, do not get lost. Always anchor your ships near a landmark, preferably the mouth of a river and always check the latitude before moving ashore. When venturing inland, again use landmarks, rivers and the latitude as your guide. Should the unmentionable occur and you find yourself unsure of your location, head towards the coast. Regaining your bearings by following the coastline is much easier than wandering the interior looking for a familiar sight.

Secondly, the Court tends to frown upon a policy of excessive violence toward the natives. Nonetheless, if the blood of Cortes boils too greatly in your veins, it is best to enter a village under friendly pretenses and seek an audience with the chief. Once the Conquistador confronts the chief, slay him and then do battle with the rest of the natives. With their chief gone, most villages generally put up a half-hearted fight before capitulating. (Note that there is much historical precedence for a maneuver such as this—the Conquistadors were a notoriously treacherous bunch.)

*Seven Cities* includes three levels of play: novice, journeyman and master. The latter two levels add a considerable number of pitfalls that can trip up an unsuspecting expedition. Men may panic in battle, food may spoil or ships may founder on unseen shoals. Expedition time also increases an expedition's rate of food consumption. Furthermore, villages do not automatically appear on the screen unless they are first detected or an expedition has a native to guide them.

In addition to variable levels of expertise, *Seven Cities* contains one other, very significant option—a world generation system. After a player completes the exploration of the historic New World, the computer will create worlds truly deserving of the denomination "new." However, these "New Worlds," as the manual is careful to point out, are not simply random associations of terrain and native villages. The computer builds each world according to geological and cultural principles. Only in the exploration of one of the computer-generated worlds will a player experience some of the true sense and wonder of discovery that must have overwhelmed the historical explorers of the 15th century.

When Columbus originally left Spain in 1492, he hoped to discover a short sea route to the lucrative spice markets of the Indies. Of course, he did not succeed in his intentions, although he first thought otherwise. Ironically, this also happens to be *Seven Cities*' chief fault: the game lacks a certain amount of spice. Once a player gains familiarity with *Seven Cities*, the mechanics of movement, exploration and dealings with the natives often become more repetitious than exciting.

Perhaps what is needed are a few more options in handling native encounters, as well as the occurrence of more frequent random events—some harmful, some beneficial and others of mere nuisance value—to add variety. In spite of the lack of spice, though, playing *The Seven Cities of Gold* does have an addictive quality. Moreover, a game which presents us with both the old and new worlds to explore and conquer, makes us unappreciative if we ask for more. C

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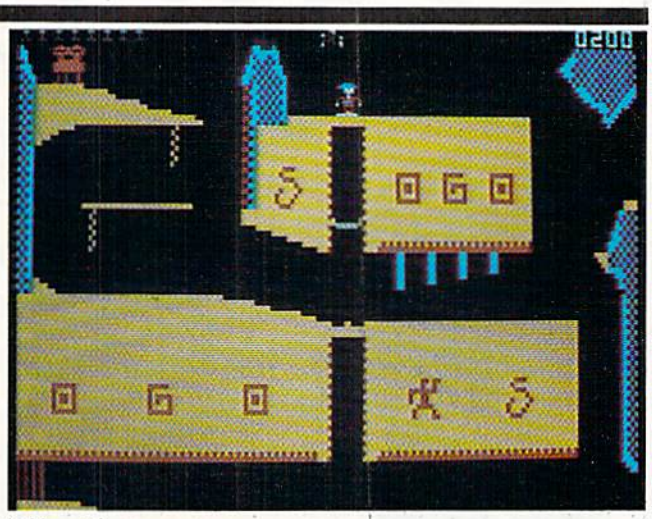
REVIEWED BY ROBERT BAKER

# The Pharaoh's Curse

**Computer:** Commodore 64
**Publisher:** Synapse Software
5221 Central Avenue
Richmond, CA 94804
**Medium:** Disk



*To succeed in stealing the treasures, you'll have to move quickly to slip past the sentries and death traps that riddle the passages.*

Somewhere in the swirling sands of the Sahara stands a secret tomb that has stood for centuries undisturbed, unknown and unentered. An ancient pharaoh lies buried within the vast twisting underground chambers. His treasures of gold, art and jewel-encrusted sacred scarabs all lie with him in the untouched chambers of the crypt.

The pharaoh vowed before his death that he and his hideous minions of the underworld must protect the treasure from all who dare defile the timeless tomb. You've spent months finding the ruins and finally you're here above the fabled spot. As you descend into the first chamber you hear footsteps. You'll have to move quickly to slip past the sentries and death traps that riddle the passages in order to steal the treasures before you perish.

As you start this real-time adventure, you appear above the pyramid and go down into the first chamber using the joystick to control your player's movements. You can walk by moving the joystick directly left or right or jump by moving it diagonally left or right. Pushing the joystick straight forward causes your player to jump up or climb. Don't worry about falling, you won't be hurt.

The pharaoh stalks the chambers eternally. He is beyond death, yet you may stop and dematerialize him temporarily by shooting him. The pharaoh's mummy is sworn to his service and searches the crypt for intruders who would steal his master's prizes. He too walks eternally but can be dematerialized temporarily. To fire bullets at either of the sentries, you simply press the fire button and push the joystick in the direction you wish to shoot. Be sure to get in the first shot, though, since both will shoot at you once they're within range.

The traps of the tomb were subtly crafted by the architects of old. They are tripped by the slightest pressure and cause you to lose one of your many lives. There are elevators and ropes throughout the chambers that help you move from level to level. Just be careful before stepping on what you think is an elevator, it may also be a trap. If you step on at the wrong time you'll be burnt to a crisp.

The winged avenger flies through the very walls of stone, stalking every corner of the crypt. He won't harm you directly, but he will clutch you in his talons and carry you off into the dark recesses of the tomb. Sometimes this can be a real help, but usually you wind up somewhere you'd rather not be. If you're a sharpshooter, you can shoot the bird and protect yourself.

There are various keys scattered within the tomb that unlock hidden passages. In order to claim the keys, you must make contact with them. Once you've picked up a key, it will stay with you until you unlock the matching door. Some of the passages are only convenient shortcuts while others offer the only access to a particular area of the crypt.

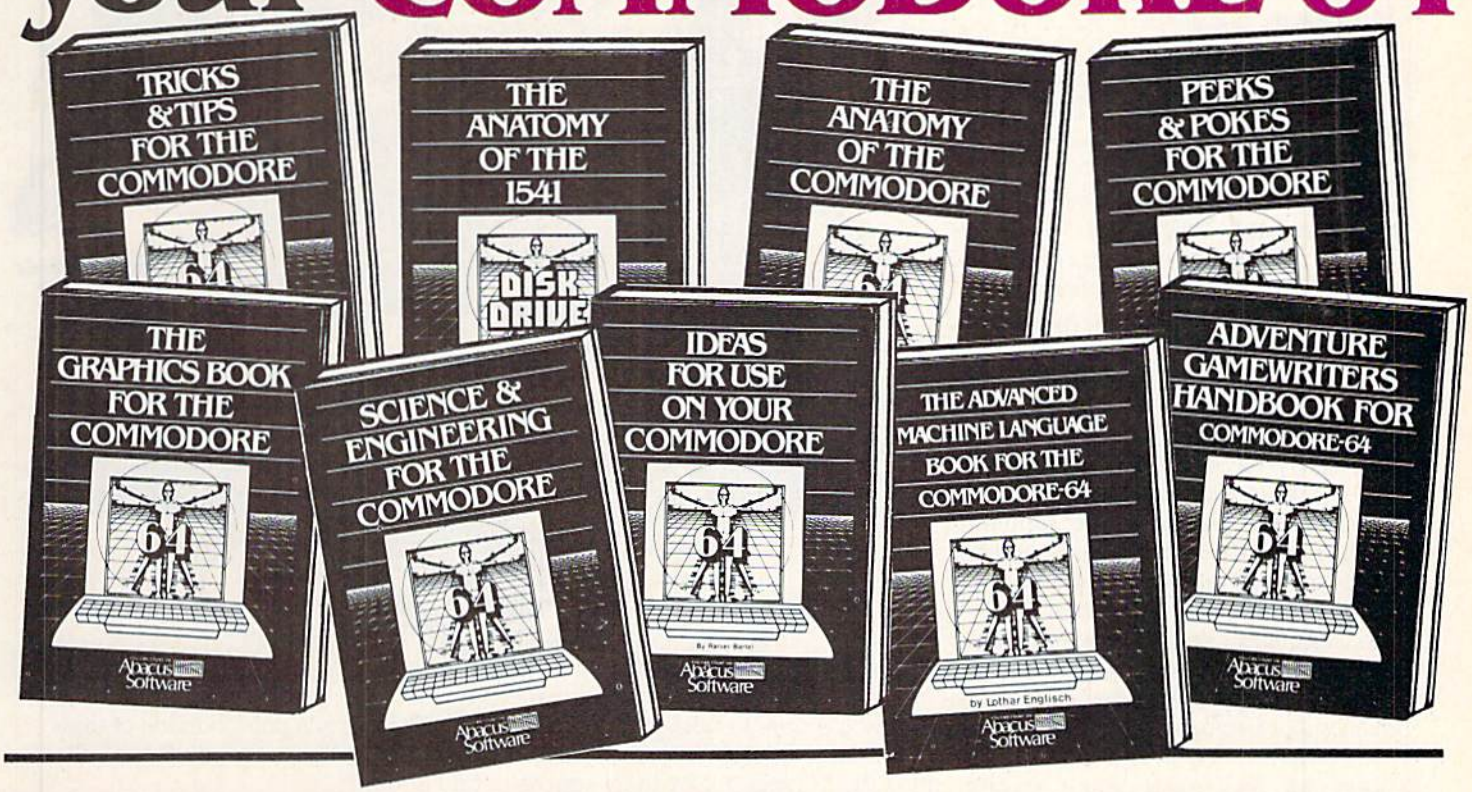
Other objects will occasionally materialize within the time during the quest. Touching a crown will endow you with an additional life. Since the objects appear only for a short time, you have to move quickly when you see them. Be careful, though, if it's not a crown then it's an arrow and you'll lose a life instead.

There are 16 treasures scattered throughout the chambers. As with the keys and other objects, treasures are claimed by touching them with your player. As each treasure is captured, one of the 16 markers at the top of the screen is removed. Thus you can keep track of the number of treasures left within the tomb. As an added bonus, you're awarded an extra life for each treasure found. You start the game with a limited number of lives and add or lose lives as you go. The game ends when you lose your last life or find the last treasure.

The function keys let you select game options and start the game. There are three levels of game play, but you'll need the secret word before being allowed to play the more difficult games. To learn the secret words you'll need to complete the lower difficulty levels successfully. It all sounds simple enough but it really takes time and practice. The pharaoh built his tomb well.

This is really an exceptional game on the Commodore 64, with excellent graphics and sound. The play action is very good and relatively easy to handle. The game is simple to play but challenging for gamesters of all ages. As with other Synapse games, a short sample of the game is available on a separate demo disk or as a demo on other game disks from Synapse. C

# Required Reading for your COMMODORE 64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REVIEWED BY TED SALAMONE

# Star Ranger

**Computer:** Commodore 64
**Publisher:** Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
**Medium:** Cartridge

Once *Star Ranger* is booted up, the game automatically enters a demo routine. Watch it, study it, do what you must, but learn the characteristics of each of the colorful attackers, because it may take some time for even the most adept gamers to reach the final sections in the "arcade" level of difficulty.

Neophytes can pilot the recon scout ship in the "play" or "trainee" versions to become more familiar with the joystick control, enemy assault patterns and required survival tactics. The "play" level doesn't tally the score and gamers have an unlimited supply of vessels at their disposal. In addition, the enemy doesn't even shoot back!

"Trainees" are given a fleet of five craft, as well as a crack at the Moonbase, a cavern-like area filled with treacherous access routes and numerous man-made obstacles. Successful completion does not, however, advance home arcaders to a more difficult level of play. Instead, the trainee round repeats indefinitely.

The true test of skills lies in the "arcade" version. As in the trainee level, a full set of attackers (Nasties, Bombers, Cibilians and Invisons) makes its intentions known. But once you get past these hurdles, the asteroid field must be negotiated and a delicate docking performed at the Moonbase. The reward: advancement to harder levels of play.

Luckily, this increase in difficulty levels doesn't continue exponentially. Six is tops, for as long as you can hold out. (Six is also the number of players that can compete simultaneously.)

Sensitive joysticks, like the Pride (ex-Amiga) Power-Stick and the Comrex CR-301, are recommended for all but the Moonbase stage. The latter requires a controller that has more oomph. Any of the Coin Controls Competition-Pro sticks will do just fine for that stage.

Now it's time to take your first solo flight. Once you are out of the space port, the Nasties make their appearance. Moving in from the screen edges, one variety homes right in on your craft. With several on-screen at any given time, the action can get pretty hairy, especially the first couple of times around.

Once over those obstacles, a green alien comes out with a Hollywood-style take-card to identify the next wave of attackers. This allows a brief intermission to adjust things like firing stance or to grab a swig of the long neglected soda. For more involved breaks, you can freeze the game up to three times by hitting the F1 key. The limitation is a nice touch because it eliminates possible abuse of the pause feature.

The Bombers lay space mines which look like cut gems. They appear to be semi-precious aquamarines, judging by their intriguing color scheme. Needless to say, contact is very deadly.

Probably the most difficult to defeat are the Cibolians, rapid firing, highly mobile creatures which spit fire from all angles. Stay high on the screen and do a quick dive-and-pullout to destroy them. Fire at the lowest part of the arc from a point outside of their weapon's range and you'll turn the tide of battle.

Invisons, unfortunately for you, become invisible for protection against your firepower. Unfortunately for them, they must reappear to attack. Mark their last location and direction of travel so you can time your shots to arrive at the place and time they reappear. It's a challenge.

The asteroid field looks a bit shabby after the excellent multi-colored sprites which make up the enemy and the Star Ranger itself. The graphics do, however, pick up again inside the Moonbase.

Sound is basically limited to realistic explosions, though a short musical interlude does play before the game starts. Thruster burn and the sizzle of high energy weapons enlivens this.

With multi-tier scoring options and well-rounded bonus routine, players can earn enough points to add to the fleet of armed recon ships, vital to the freedom of the galaxy.

Smooth action, adequate audio effects, above average sprites and a lot of challenge; all these combine to make *Star Ranger* a worthy addition to every game library. C

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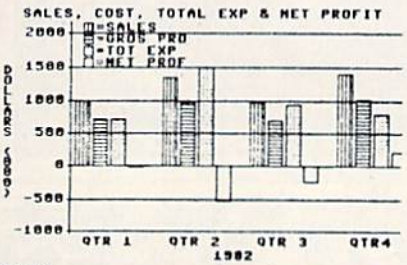


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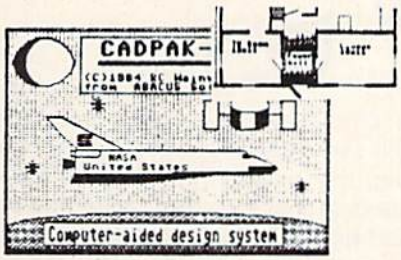


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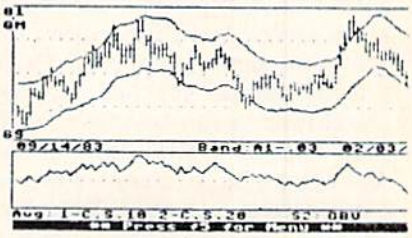

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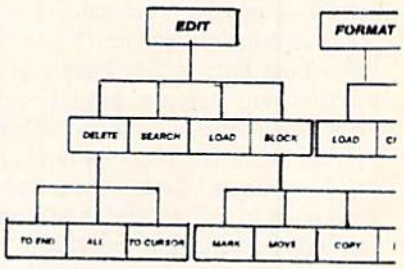


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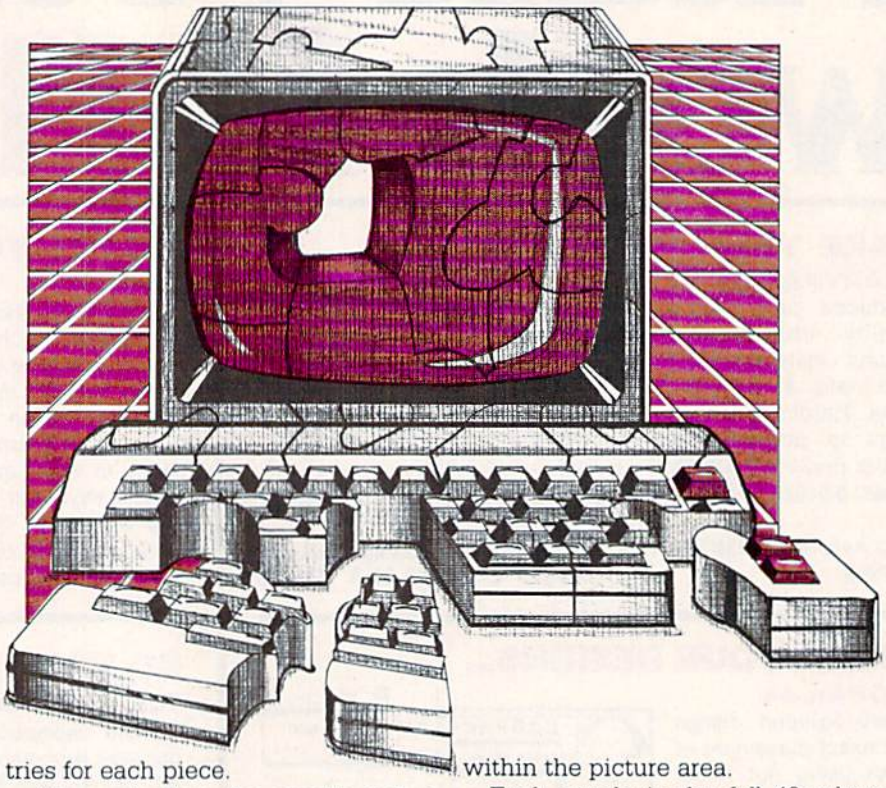
Circle Reader Service No. 2

REVIEWED BY ROBERT BAKER

# Puzzle Mania

**Computer:** Commodore 64
**Publisher:** Readers Digest
Pleasantville, NY 10570
**Medium:** Disk



*Puzzle Mania* adds an interesting twist to computer graphics by letting you create and solve jigsaw puzzles on your home computer. There are seven puzzles supplied on disk and each puzzle can be solved at any of six difficult levels. Easy levels give you something to start with, help if you need it and only a few pieces to insert. Harder levels have more pieces, a limited number of tries or a time limit.

In all levels of play, your total number of tries is recorded so you can compete either with others or just yourself. If you don't get time to complete a puzzle, you can save what you've done on disk and finish it later. The best part is that *Puzzle Mania* is more than solving pre-fab puzzles; not only can you change the existing puzzles, but you can create your own.

The *Puzzle Mania* screen directions are easy to follow, with additional detailed information provided in the manual. Functions are selected from simple command menus until you're actually solving a puzzle. If you forget what the commands are, you can always return to the menus for help.

The first menu to appear after you load the program lists the main functions. You can choose a puzzle to solve, finish a puzzle you saved or create your own. When choosing a puzzle, another menu shows a list of the seven standard puzzles to pick from, as well as an option to get a puzzle from another disk.

After the puzzle is selected, another menu lets you select the desired difficulty level. Each puzzle has 32 pieces and the least difficult level leaves nine pieces for you to insert. Higher levels leave 18, 22, and finally all 32 pieces to be found. On all of these levels, help is available. When requested, a red dot will show you where the piece belongs, but you'll still have to find the correct orientation. The two highest difficulty levels do not offer help and only allow limited time and a limited number of tries for each piece.

After selecting the puzzle and a level of difficulty, you'll see a list of instructions for solving the puzzle. The cursor keys are used to move a piece up, down, left and right as you try to position the piece in the puzzle. Other keys let you turn a piece around, get another piece, look at the entire picture, get help with positioning, switch the sound effects on or off or return to the menu. When you think a piece is correctly positioned, you simply press the space bar and the sound effects will quickly let you know if you're right or wrong.

While solving a puzzle, you can always return to the puzzle mini-menu. From that menu, you can ask for help with positioning a piece, see the instructions again, look at the entire picture or see more menu options. The additional options let you save the current puzzle, paint in changes, or stop and return to the main menu.

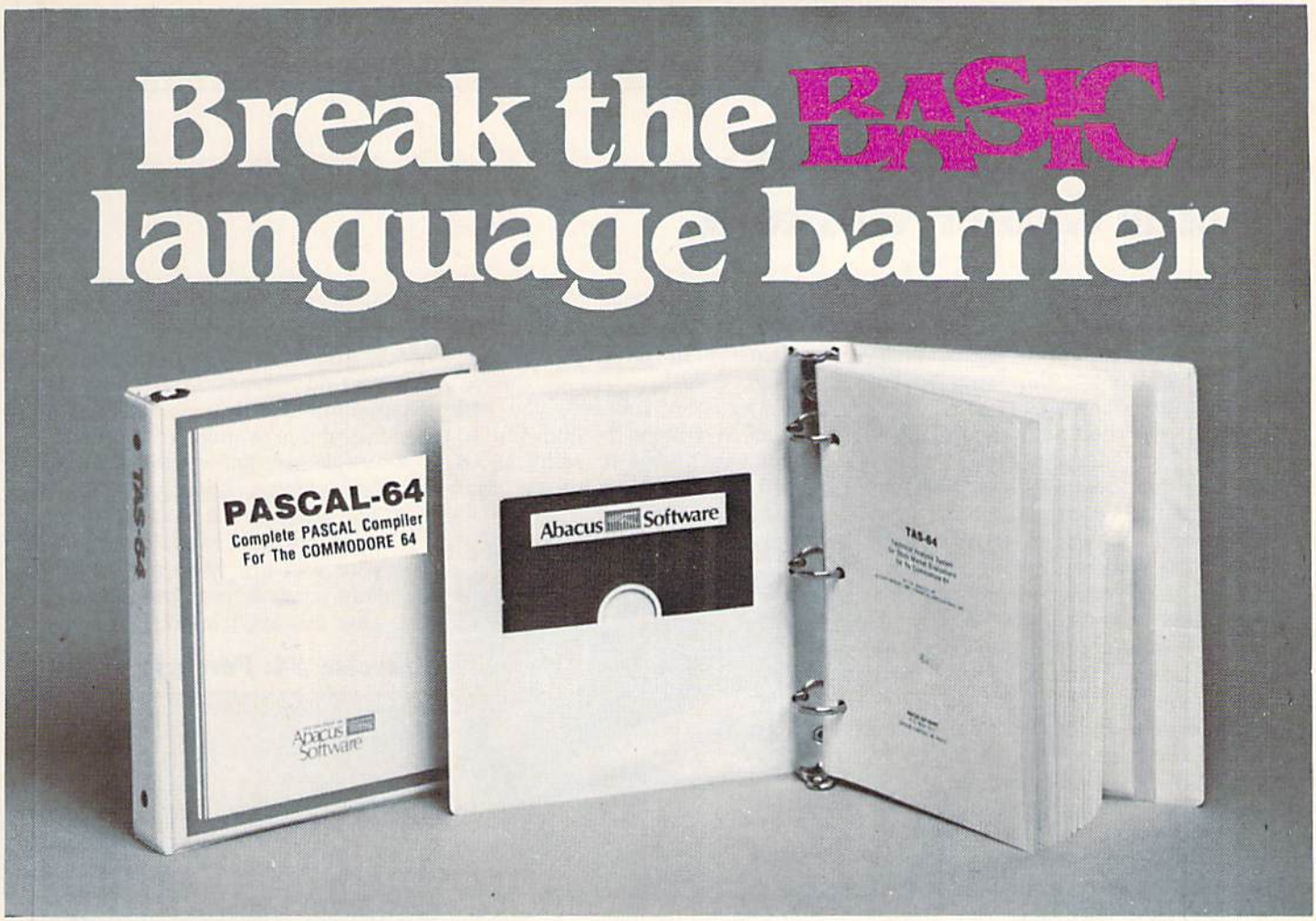
When you're tired of the supplied puzzles, you can paint in changes to those puzzles or create your own puzzle from scratch. The menu for creating puzzles lets you select a new color or graphic character, fill a large area of the puzzle or replace an existing color in the picture. You can also start and stop painting or switch to text mode to type in character strings within the picture area.

Each puzzle is the full 40-column screen width, but only 19 lines high. As you use the cursor keys to move the cursor, the current position will be indicated at the bottom of the screen. While you are painting, the selected color will appear as you move the cursor. If a graphic character is selected, that character will be displayed at each location in the selected color.

You can even make a puzzle from any standard character mode graphic found on disk or from a picture you have created. You don't need to start with the *Puzzle Mania* program to make a puzzle; just follow the easy step-by-step instructions at the end of the manual.

The program controls and menu options provided make the program extremely simple to use. Just be sure to follow the menu step by step, because often you cannot go back. My only disappointment with the entire package was the fact that the high-resolution graphic capabilities of the 64 were not used. The character graphics are much less impressive and make positioning some pieces more guesswork than skill. As a whole, though, the package is well done with excellent documentation. C

# Break the BASIC language barrier

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Circle Reader Service No. 3

BY STEVE FINKEL

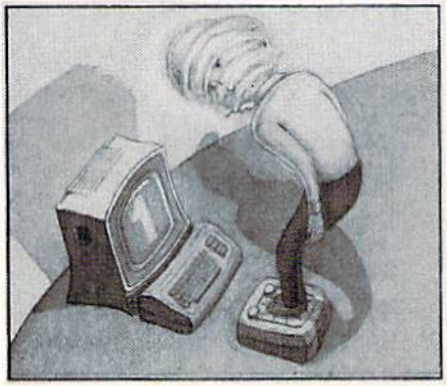
# The Joystick Lunatic Home Gamer Workout

People are often born to be great artists. Picasso was. Van Gogh was. Rembrandt was born to be two great artists, which possibly explains his rather impressive girth.

Even with their natural gifts, these men had to undergo rigorous training to fulfill their destinies. It's the same with great athletes, great chefs, great actors and actresses (except for those who write workout books), great musicians and even great gamers. It's dedicated practice—working out every day—that transforms a simply talented person into an outstanding achiever in his or her field.

Look at your hands . . . notice the palms, the fingers (five) and the way you can manipulate them. It's as if your hand were created to hold a joystick. Your eyes . . . stare straight ahead, look left, then right . . . perfect for following aliens around the screen. Reflexes are important also . . . walk out into traffic from between two parked cars . . . see what quick and sure reactions you have! It's obvious that you were intended to be a gamer, and you have the potential to be a great one. All you need to do is hone and strengthen those natural abilities with the exercises in this guide.

## Exercise #1: Loosening Up

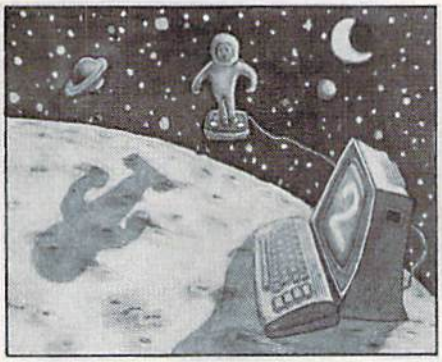


Turn your head slightly to the left. Then turn your head slightly to the right. Now turn your head even further to the left, then even further to the right. Now turn your head in a 360-degree rotation. You are now sufficiently loose.

Benefits of this exercise:

- You can make sure no one is sneaking up on you while you play.
- If you chew tobacco, you can place a spitoon behind you so you won't have to worry about getting tobacco juice on your monitor screen.

## Exercise #2: Ear Closing



Stare straight ahead. Ignore all sound. Ignore the sound with your left ear. Ignore the sound with your right ear. Ignore with both ears. If you can read lips, close your eyes as well.

Benefits of this exercise:

- Allows you to focus your concentration solely on the game at hand.
- Helps you completely ignore everything that's going on around you, such as noise from your competitor, children crying, dogs barking, munitions factories exploding, etc.

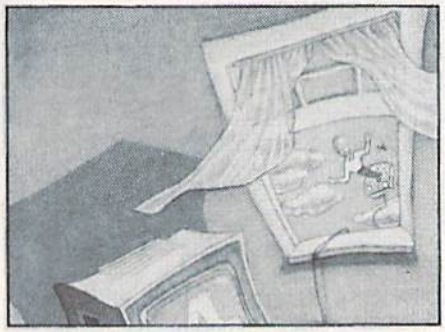
## Exercise #3: Forehead Slap

Extend your fingers, holding them rigidly together. Hold your arm away from your body at a 90-degree angle. Swiftly bring your hand to your forehead. Accentuate this exercise by shouting an expression of dismay or disappointment.

Benefits of this exercise:

- People will know that you take your gaming seriously.
- Any flies that are buzzing around your forehead will fall victim to your well practiced motion. (Be sure to wash your forehead well after this application.)

## Exercise #4: Forearm Swing

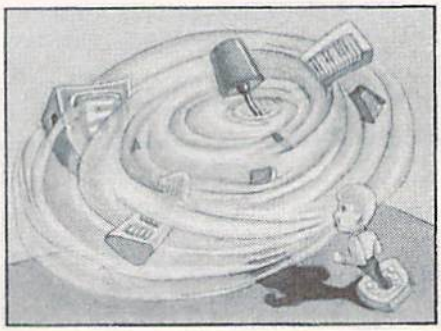


Cup your four fingers together and touch your thumb to your middle finger, forming a ring with your hand. Keeping your elbow at your side, move your forearm left and right, front and back, while maintaining the same hand position.

Benefits of this exercise:

- Improves flexibility and control of joystick.
- When practiced in movie theaters, you won't have to worry about people (particularly mothers with young children) crowding you.

## Exercise #5: Breathing



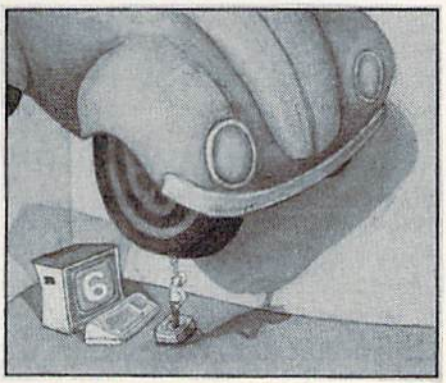
DEBBIE GIORNO

Inhale deeply. Then exhale. Take another breath. Now let it out, making a slightly "whoosh" sound. Repeat indefinitely.

Benefits of this exercise:

- Provides interesting sound effects on tougher rounds.
- Keeps them from hooking you up to the respirator.

## Exercise #6: Thumb Press

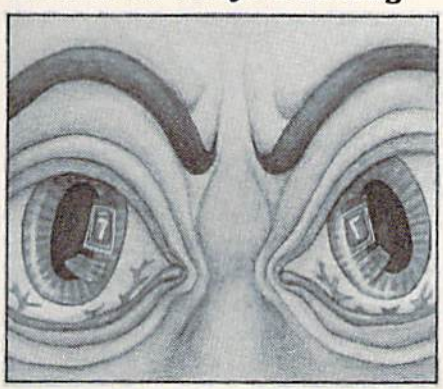


Tape a penny onto your thumbnail. Lift your thumb into a straight-up position, then lower your thumb. Repeat this ten times. Remove the penny and replace it with a nickel and repeat the ten up-and-down thumb-lifts. Progress to heavier objects: quarter, half dollar, silver dollar, Volkswagen.

Benefits of this exercise:

- Bulging thumb muscles.
- Good preparation for hitch-hiking.

## Exercise #7: Eye-Building



Shift both eyes to the left. Shift them both to the right. Look up. Look down. Cross your eyes. Look left with one and right with the other. Narrow your eyes. Raise the left eyebrow, then the right. Now raise them both. Open your eyes as wide as you can. Stare straight ahead. Maintain a "glassy-eyed" look. Stay in this position for several hours.

Benefits of this exercise:

- Strengthens the necessary muscles for hours of hard staring at monitor screens.
- Discourages unwanted social interaction, since people will tend to leave you alone.

## Exercise#8: Elbow Endurance

Plant your right elbow on the right armrest of your chair. Make a fist with your right hand. Hold your left hand slightly cupped about two inches beneath your right hand. Practice moving both hands in any direction while keeping your elbow firmly planted. Turn on a fan that blows air directly into your face; keep your elbow firmly planted. Put ice cubes down the back of your shirt; keep your elbow firmly planted. Have someone hit you upside your head with a croquet mallet and lose consciousness; keep your elbow firmly planted.

Benefits of this exercise:

- Contributes to a rock-solid play concentration.
- Improves your ability to hold poses for portraits painted by excruciatingly slow artists.

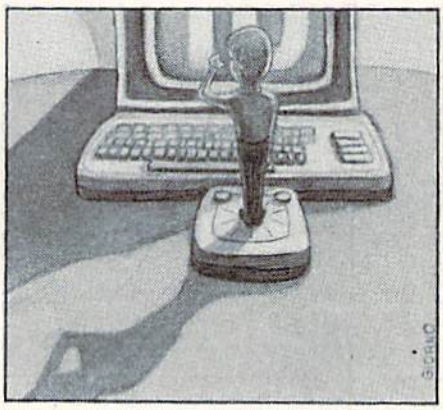
## Exercise #9: Teeth Gritting

Close your mouth. Keep your upper and lower jaw shut, so that your teeth are tightly closed. Curl your upper and lower lips to expose your teeth. Wrinkle your nose menacingly and grimace. Uncurl your lips. Curl. Uncurl. Continue until you feel your chin falling off.

Benefits of this exercise:

- Helps you bear down and play tough.
- Scares small children.

## Exercise #10: Thumb-Ups



Make a fist by curling your four fingers, but extend your thumb straight up. Then touch the tip of your nose with your thumb. Now extend your fingers. Repeat facing different people and objects in the room.

Benefits of this exercise:

- Strengthens your nose-scratching efficiency, since this practice will eventually enable you to touch your nose without looking.
- Satisfying gesture toward monitor screen when you fail or opponent when you lose.

This ten-step workout improves the necessary skills to make you into a first-rate, top-notch, head-and-shoulders-above-the-crowd, All-American (and-any-other-term-with-a-lot-of-hypens) gamer. A true dedication to this workout is required to become a truly great gamer; if you commit yourself to this workout regimen with a real heart-felt vigor and you fail to improve your gaming ability, then you probably had no potential in the first place. In that case, you can console yourself with the fact that you gave it your best shot. Loser.

But if you do have the right stuff, you can indeed become a great one, with a lot of work. Remember, nobody ever said that videogaming was supposed to be fun! C

BY JERRY A. STURDIVANT

# Hail for PET and Commodore 64

It doesn't rain all the time where I live in Oregon. Sometimes we have hail.

As the hail stones come down, you must keep your constantly moving man from getting hit on the head. He won't stand still. He will move to the left unless you hold down a key, which causes him to move to the right. If you keep him from harm long enough (about 40 seconds), you win. If not, you lose and receive your score.

The idea behind this program is to write a game on as few lines as possible. This program squeezes into three lines if you use abbreviations. Or you can spread the program out to additional lines.

Line 1 initializes variables. In line 2, screen location (S) changes. If keyboard memory (K) shows no key is held down (L), one is subtracted from S. Otherwise one is added.

D is poked to send the cursor down the screen, the location on the line is figured (S-X) and the person printed. On the PET the person (P) is poked in.

The IF statement checks if time (T) is up or if the person has a hail stone on his head. If either is true, then the proper end (E$) is printed, followed by the score (T). The keyboard entries you have been making are cancelled with a poke (C) and the program ends.

In line 3, time keeping (T) is updated by a half. The screen location of the person is checked to see if he has bumped into either wall. If so, S is changed to bounce him back into the fray (no hiding in the corners).

A hail stone is placed in a random location on the second line down. The cursor goes to the top right of the screen (by going home, down and back one) and does an insert, scrolling the screen down and the person off. The poke tells memory that it did not scroll the screen.

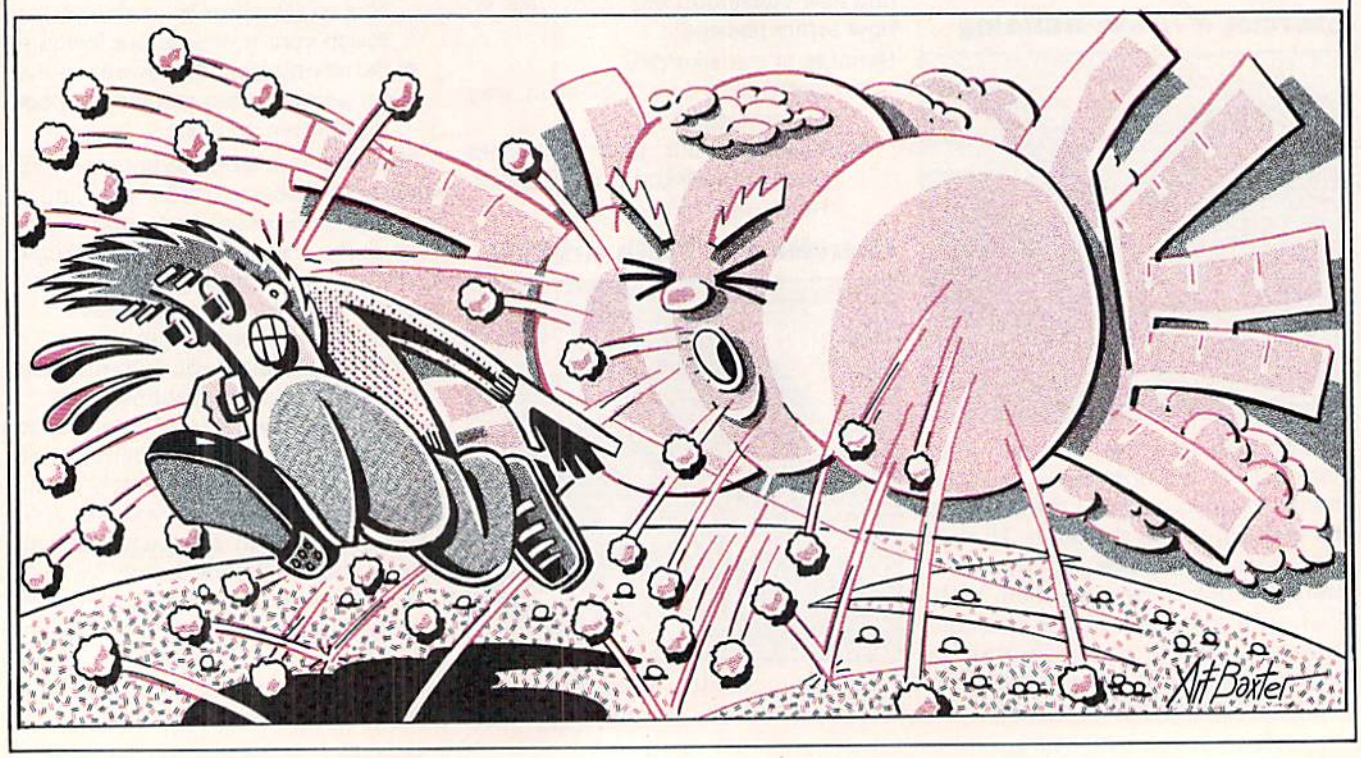
When entering the abbreviated BASIC words, enter the first letter and then hold down the SHIFT key and hit the second letter. That is your BASIC word. On the word TAB, it will also include the left parenthesis: TAB(. C

## 64 Version

```
1 PRINT"[CLEAR]":S=2003:B=S:K=203:L=64
  :D=214:X=1984:F=40:H=81:C=198
  :E$(0)="WIN":E$(1)="LOSE
2 S=S+(PEEK(K)=L)*2+1:POKE D,23:PRINT
  :PRINT TAB(S-X)"[SHFT X,HOME]"
  :IF T=K OR PEEK(S-F)=H THEN PRINT
  E$((T=K)+1)T:POKE C,0:END
3 T=T+.5:S=S+((S>B+18)-(S<B-18))*3
  :PRINT"[HOME,DOWN]"TAB(39*RND(0))"
  [SHFT Q,HOME,DOWN,LEFT,INST]"
  :POKE 218,132:GOTO 2
```

## PET Version

```
1 PRINT"[CLEAR]":S=33747:B=S:K=151
  :L=255:P=88:F=40:H=81:C=158
  :E$(0)="WINNER":E$(1)="LOOSER
2 S=S+(PEEK(K)=L)*2+1:POKE S,P
  :IF T=K OR PEEK(S-F)=H THEN PRINT
  E$((T=K)+1)T*2-2:POKE C,0:END
3 T=T+.5:S=S+((S>B+19)-(S<B-18))*3
  :PRINT"[HOME,DOWN]"TAB(F*RND(0))"
  [SHFT Q,HOME,DOWN,LEFT,INST]"
  :POKE 225,128:GOTO 2
```



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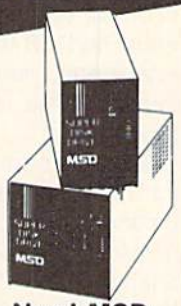

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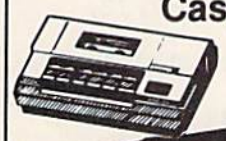

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# Commodore 64 Color Interrupter

The color interrupter is a short program which allows the user to change screen colors while a BASIC program is running. This is especially useful for owners of black and white monitors who prefer high-contrast color combos, but it can find a home on every 64 owner's gadget disk.

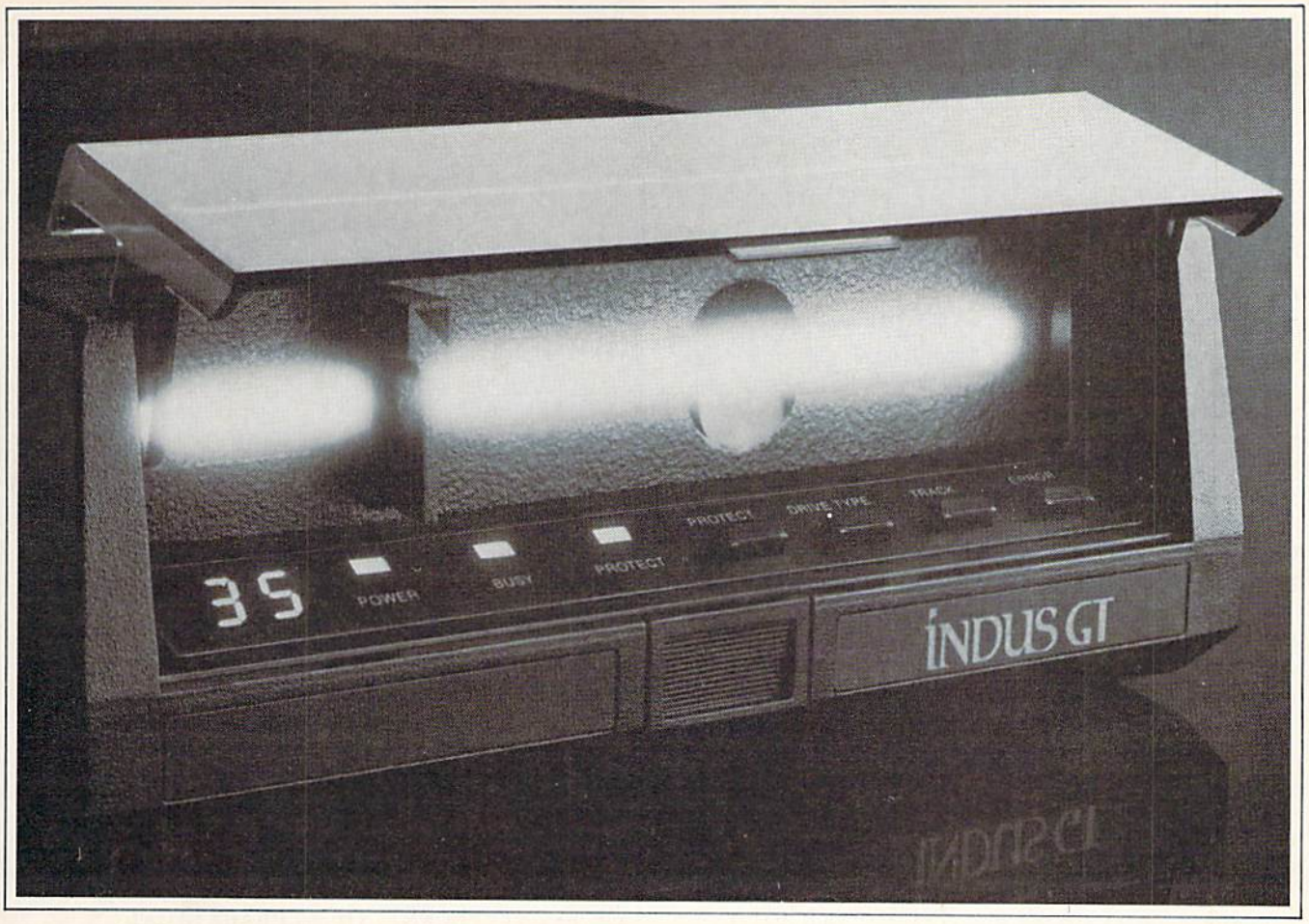
The program occupies the last 100 bytes of the free RAM, which extends from 49152 to 53247. This location is out of the way of most programs and won't interfere with the DOS wedge if it's in place. To enable the color interrupter, simply type in the BASIC program listed here and run it. Then load and run any other BASIC program.

The program works by changing the vector to the routine that checks the stop key, rerouting to check the back arrow key on the upper left of the keyboard, and restoring the stop-key check. This means the program will work only if the stop-key check or interrupt vectors haven't been changed. This is true of most BASIC programs.

Pressing the back arrow during program execution freezes the program. The function keys then toggle the various color registers. Function 7 resumes the program from where it left off.

The color interrupter is especially useful if a program changes screens a lot. The extra key check only requires two machine language instructions so it slows BASIC by very little. If you own a black and white screen, there's no reason not to make it a habit. You'll find it eases eyestrain and makes your world more readable. C

```
10 REM         ** COLORRUPTOR **'BPLB
20 FOR A=53088 TO 53247:READ I
   :POKE A,I:NEXT'GSNF
30 SYS 53088'BFPA
40 PRINT"[CLEAR,DOWN2]COLORRUPTOR IS
   NOW IN PLACE."'BAMJ
50 PRINT:PRINT"BACK ARROW KEY HALTS
   PROGRAM EXECUTION.":PRINT'DCBN
60 PRINT"FUNCTION KEYS: 1.CHANGE
   BORDER COLOR"'BALM
70 PRINT"[SPACE15]3.CHANGE SCREEN
   COLOR"'BASL
80 PRINT"[SPACE15]5.CHANGE TEXT
   COLOR"'BAAL
90 PRINT"[SPACE15]7.RESUME PROGRAM"
   :PRINT:NEW'DCON
100 DATA 120,173,40,3,141,248,207,
    173'BDCA
110 DATA 41,3,141,249,207,173,250,
    207'BDGB
120 DATA 141,40,3,173,251,207,141,
    41'BCUC
130 DATA 3,88,96,165,145,201,253,
    208'BCWD
140 DATA 116,120,169,0,133,198,32,
    159'BDNE
150 DATA 255,32,228,255,201,0,240,
    246'BDDF
160 DATA 201,133,240,15,201,134,240,
    23'BEDH
170 DATA 201,135,240,31,201,136,240,
    84'BEMI
180 DATA 76,130,207,173,32,208,24,
    105'BDFI
190 DATA 1,141,32,208,76,130,207,
    173'BCCJ
200 DATA 33,208,24,105,1,141,33,
    208'BBVB
210 DATA 76,130,207,165,243,141,252,
    207'BFCD
220 DATA 165,244,141,253,207,169,0,
    133'BEDE
230 DATA 243,169,216,133,244,173,134,
    2'BEFF
240 DATA 24,105,1,141,134,2,162,4'BYRF
250 DATA 160,0,145,243,136,208,251,
    202'BERH
260 DATA 240,5,230,244,76,216,207,
    173'BDJH
270 DATA 252,207,133,243,173,253,207,
    133'BGAJ
280 DATA 244,76,130,207,88,108,248,
    207'BERK
290 DATA 237,246,123,207,2,0,255,
    255'BCIK
```

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BY LOUIS F. SANDER

# 1541 Directory Alphabetizer

The 1541 disk directory is a wonderful tool, but it's a tool with a major drawback: the sequence in which the recorded items, (called files), are listed.

The directory lists files in order of their physical location on the diskette, which is not necessarily the order in which they were saved. Nor is there any *other* humanly comprehensible order.

Here's why. On a newly formatted diskette, each new file is added to the end of the directory. But when a file is scratched, it leaves an invisible opening in the directory, and that opening will be taken by the next file to be recorded. After a diskette has been used for a while, with many files scratched and replaced, you can't tell *where* the next directory entry will pop up. Finding *any* given file in a long directory can be *most* unrewarding.

The program listed here solves the problem by alphabetizing the directory and printing it on the screen or printer. The alphabetized directory has the same form as the standard one, and adds a count of the files on the diskette. I've found this program to be worth its weight in gold, and I think you'll like it, too.

Lines 150-290 read the directory from the 1541, storing the file names and other information in array F$. Lines 300-460 sort the array, which is then printed by lines 470-500. Typically, the program takes 30 seconds or so to do its work, but with very full diskettes it can take several minutes. Reading the directory is the time-consuming process; I've searched in vain for a way to read it instantaneously into an array. (Not that the way shown here is *long*, mind you, it just seems that it should be *instantaneous*.)

Sorting the array takes only a few seconds. On one diskette with 143 programs, it took almost a minute. If you wanted to, you could save time by replacing lines 300-460 with a machine language sort routine. You could also add this line, which will suspend printing as long as SHIFT or SHIFT LOCK are depressed:

```
495 IF PEEK(653) THEN 495
```

This is particularly useful when you''re printing a long directory onto the screen.

That's all there is to the Directory Alphabetizer. With a minute or so of work, it can give you an easy-to-use hardcopy alphabetized directory listing, which can save you *many* minutes of searching and frustration. C

```
100 PRINT"[CLEAR,DOWN] THIS PRINTS A
    DIRECTORY"
110 PRINT"[DOWN] IN ALPHABETICAL
    ORDER."
120 PRINT"[DOWN] PRINT ON [RVS]S
```

```
    [RVOFF]CREEN OR
    [RVS]P[RVOFF]
    RINTER?"
130 GET OD$:IF
    OD$="P"OR
    OD$<>""THEN 150
140 GOTO 130
150 PRINT"[DOWN]
     ** READING THE
    DIRECTORY **"
160 DIM F$(144):B=6
    :C=2:Q$=CHR$(34)
    :R$="[RVS]"
    :SP$="[SPACE17]"
170 OPEN 1,8,0,"$"
    :GET#1,A$,B$
180 GET#1,A$,B$
    :REM LINK
190 GET#1,A$,B$
    :NB=ASC(A$+CHR$(0)
    )+256*ASC(B$+CHR$
    (0)):REM # OF
    BLOCKS
200 GET#1,B$:IF ST<>0
    THEN 290
210 IF B$<>CHR$(34)
    THEN 200
220 GET#1,B$:IF
    B$<>CHR$(34)THEN
    S$=S$+B$:GOTO 220
230 GET#1,B$:IF
    B$=CHR$(32)THEN
    230
240 C$="":IF A=0 THEN
    C$=" "
250 C$=C$+B$:GET#1,B$
    :IF B$<>""THEN 250
260 F$(A)=LEFT$
    (R$+Q$+S$+Q$+SP$,
    19)+LEFT$(C$,B)+"
    [RVOFF]"+MID$
    (STR$(NB)+SP$,2,C)
270 S$="":R$="":A=A+1
    :B=3:C=5
280 IF ST=0 THEN 180
290 CLOSE 1:N=A-1
    :BF$=MID$(STR$(NB)
    +" BLOCKS FREE,
    "+STR$(N)+"
    FILES.",2)
300 PRINT"[DOWN]
     ** SORTING
    DIRECTORY **"
310 M=N
320 M=INT(M/2)
330 IF M=0 THEN 470
340 J=1:K=N-M
350 I=J
360 L=I+M
370 CM=CM+1
380 IF F$(I)<F$(L)
    THEN 440
390 T$=F$(I):F$(I)=F$
    (L):F$(L)=T$
400 SW=SW+1
410 I=I-M
420 IF I<1 THEN 440
430 GOTO 360
440 J=J+1
450 IF J>K THEN 320
460 GOTO 350
470 IF OD$="P"THEN
    OPEN 4,4:PRINT"
    [DOWN] **
    PRINTING
    DIRECTORY **"
    :CMD 4
480 IF OD$<>"P"THEN
    PRINT"[CLEAR]"
490 C=2:FOR I=0 TO N
    :PRINT RIGHT$(F$
    (I),C)LEFT$(F$(I),
    LEN(F$(I))-C):C=5
500 NEXT:PRINT BF$
510 IF OD$="P"THEN
    PRINT:PRINT:PRINT
    :PRINT#4:CLOSE 4
520 IF OD$<>"P"THEN
    PRINT"[DOWN]
    USE 'GOTO 480' TO
    VIEW LISTING
    AGAIN"
```


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BY JOHN STILWELL

# Defined Functions on the VIC and 64

Defined functions are a nice way to simplify one's code. They not only reduce line lengths but are easier to read than subroutines. They do have one limitation that subroutines don't have. Functions can be only one equation, whereas a subroutine can be an entire program.

A user function must be defined before it is ever used. As with DIM, it is good practice to define all functions in the beginning of the program.

Let's create a simple user-defined function.

```
10 DEF FNDB(x) = x * 2
```

The DEF tells the computer that the function is being defined. The FN means that the function is user-defined and the DB is the name of the function. The name can be up to two characters long and the second character may be a numeral.

Now that the function has been defined, we can use it just like a SQR or INT.

```
20 A = FNDB(A)
```

Line 20 takes the number in "A," doubles it, then puts the new value in "A." To help clarify things, line 20 could be written like this.

```
20 A = A * 2
```

If the function is used, the value in "A" is moved to "x" so that the math in line 10 can be done. The answer is assigned to FNDB(A) which can be thought of as a kind of super variable. In actuality, it is only shorthand for an equation.

For the next example, we want a function that rolls a die. To make things interesting, we'll allow the die to have any number of sides.

```
15 DEF FNDI(y) = INT(RND(.) * y) + 1
```

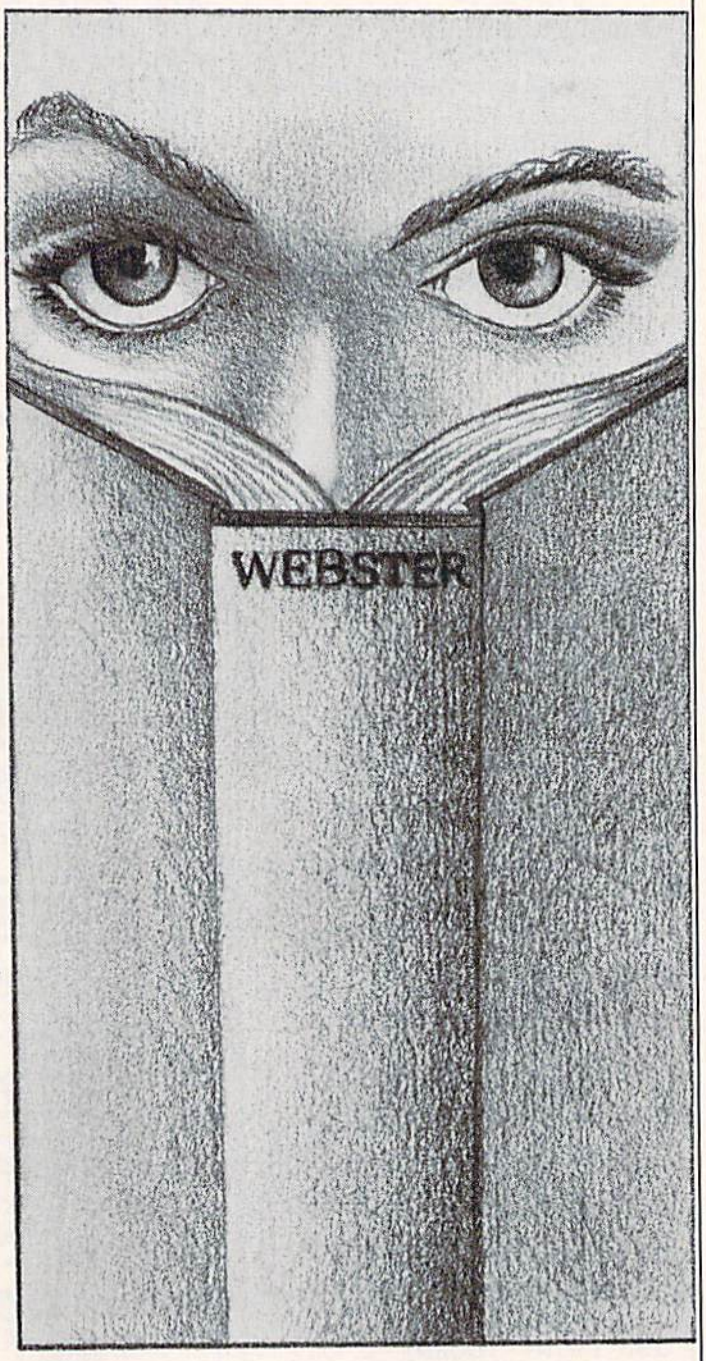
Just for the record, the "y" could have been an "x" as in line 10. It doesn't matter what variable is used because it has the special quality of being transparent. In other words, the value assigned to the "y" in our function is not necessarily the same as "y" elsewhere in the program. This applies only to the variable in the parentheses of a DEF statement.

If you have trouble digesting this, think of the variable as a special memory that exists only when the function is used. For convenience's (or inconvenience's) sake, we may use the same name as another variable in the program.

```
30 PRINT FNDI(6)
40 PRINT FNDI(10)
```

When you run the program, line 30 will give you a random number between one and six. Line 40 will give you a number between one and ten.

Unfortunately, a function can pass only one number to the equation via a transparent variable. If there is more than one variable used in a function, then the rest are not unique. For example, let's change the equation so that we can set both the upper limit and the lower limit of the random number.




```
15 DEFDI(y) = INT(RND(.) * y) + z
```

The "z" is the smallest value our random number can be. Since it's not in the parentheses on the left side of the equation, it is the same variable as the "z" that appears elsewhere in the program. We can pass only one variable through a function, so the "z" must get its value somewhere else.

```
25 z = 3
```

Now when we run the program, line 30 will give us a number between three and six and line 40 will give us a number between three and ten. C

BY ANDY GAMBLE

# Guitar Chord Finder

*For the PET, 64, and Expanded VIC 20*

Family, friends and neighbors of beginner guitar players do not need to be reminded of what a C major chord sounds like. The guitar is widely recognized as being an easy instrument to learn and it is true that many popular songs can be played with only three chords. This is why the C, F and G7 seem to be the ones with which to begin.

As a result, many guitarists become stuck in this three-chord syndrome and few progress beyond learning a dozen or so chords in the easiest positions. The remedy is to purchase a chord dictionary. There you will see hundreds, if not thousands, of possible chords. Need to know what an A sharp minor seventh is? Just look it up.

This program is essentially a chord dictionary, but one with a difference: it can be customized. You don't like the sound of a particular chord? Then delete it. Found another shape for a chord or a whole new chord? Then add it.

To use the chord finder as it stands is child's play. Follow the directions that appear on the top line of the screen. Suppose you wanted to know how to play that A sharp minor seventh chord. Clear the title page by pressing RETURN. You are now asked for the root of the chord. In this case, press "A". Any key outside the range A to G will be ignored. You are then asked whether you want flat, sharp or natural, so press "S" for sharp. Any key other than S, F or N is ignored.

Next, a menu appears offering a selection of 23 chords. The minor seventh is letter D. Press that and after a few seconds the first chord shape will be given, as shown in Figure 1.

Most chords have more than one shape. To see different ways of playing this chord, press RETURN. Figure 2, for instance, shows another shape for A sharp minor seventh. (The "5" here means the fifth fret.) Pressing RETURN will let you choose another chord and Q will quit the program. Notice that the chords are positioned on the guitar neck either by labelling the nut or the starting fret.

There is considerable redundancy in musical language (at least for guitarists). D flat is the same as C sharp, for instance. In order to save memory space in this program, this redundancy is removed. Try retrieving a flat chord—D flat for example. As soon as D flat is entered, the program changes this to C sharp.

*Musicians did not like Strauss' "Elektra" at all. One eminent British composer, upon leaving the theater, was asked what he thought of it. "Words fail me," he replied, "and I'm going home at once to play the chord of C major twenty times over to satisfy myself that it still exists."*

*(Sir Thomas Beecham, A Mingled Chime).*

Customizing the chord dictionary to your own preferences is just as easy. A glance at the data lines shows that any chord is characterized by a three-letter name, a one-digit number and several six-digit numbers. For instance:

line 280 DATA ASD,2,113121,686696, . . . .

The first letter of the three-letter group is the key, A to G, modified by S, F or N as the second letter (sharp, flat or natural). The third letter is the chord type as shown in the diagram above. Thus, ASD is A sharp minor seventh. The single digit that follows the chord type gives the number of different ways the chord can be written—in this case, two. If you find another way or would like to delete a chord shape, this number should be changed.

The next two groups of six digits are the standard way of writing the chord shapes in terms of frets, starting from the bass E string to the top E string. So, 113121 represents the configuration in Figure 3.

Feel free to add to or delete chord shapes from the dictionary in this way. An X in these numbers means that the particular string should *not* be played and a zero means that the open string should be played. Notice also that this method can only handle chord shapes up to the ninth fret.

This program needs about 10K bytes and works on the PET, expanded VIC or 64. VIC and 64 users should

*Continued on pg. 48*

**Figure 1.**

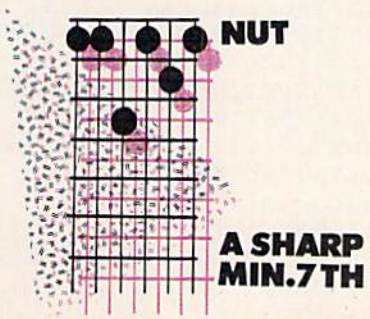



**Figure 2.**

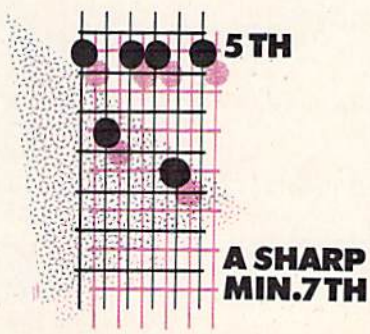
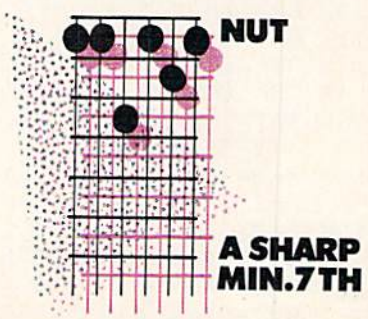



**Figure 3.**



# GUITAR CHORD

delete lines 2670 and 2680 which merely put a border around the screen for PET users. VIC users should additionally set the variable LL in line 1500 to 22 and perhaps adjust the TAB positions in lines 2720 and 2730.

For anatomists of programs, there follows a dissection.

**The Program**

**Lines 150-1490:** Data for all the chords, A natural to G sharp.

**Lines 1520-1800:** Initializing variables. Note that BL$ in line 1550 contains 40 blank.

**Lines 1810-1920:** Enter the root and S, F or N.

**Lines 1930-1960:** Checks for B sharp, etc.

**Lines 1970-1990:** Converts flats to sharps.

**Lines 2000-2040:** Prints chosen chord at bottom of screen.

**Lines 2050-2130:** Choose chord type and print it.

**Lines 2140-2190:** Search for chord in data statements.

**Lines 2200-2220:** End program or cycle back.

**Lines 2230-2260:** Is chord in first position or higher up the neck?

**Lines 2270-2330:** Print first position chord.

**Lines 2340-2430:** Print higher position chords.

**Lines 2440-2480:** Any more shapes for that chord? If so, READ them. If not, cycle back.

**Lines 2490-2510:** GET subroutine.

**Lines 2520-2550:** Neck-drawing subroutine.

**Lines 2560-2570:** Blank one line subroutine.

**Lines 2580-2620:** READ chords from data statements. End of file is an asterisk. Since reading this mass of data from the start takes a fair amount of time, the data is restored only if the next chord to be searched for is alphabetically before the last one (line 2590) or the end of file has been reached (line 2600). Otherwise the reading continues on from the last chord.

**Lines 2640-2750:** Title page (optional).

When typing the program, note that the cursor controls have been written out in square brackets ([]) for your convenience. You should, of course, type the corresponding cursor control character. For example, in line 1540, the variable VT$ consists of "home" and 26 "cursor down's." **C**

```
100 REM GUITAR CHORDS'BMEY
110 REM ANDY GAMBLE,COLUMBIA
    COLLEGE'BBND
120 REM 1625 W 10 AVE VANCOUVER
    BC'BVVD
130 REM (C) FEB 84'BIQA
140 REM FOR PET,VIC WITH 10K,C64'BVUF
150 DATA ANA,3,002220,002225,
    577655'BBBF
160 DATA ANB,2,002020,575685,ANC,2,
    002210,577555'BOPJ
170 DATA AND,2,002010,575585,ANE,2,
    002120,X07654'BOUK
180 DATA ANF,2,002230,X07755,ANG,2,
    002030,575755'BOEL
190 DATA ANH,2,002222,5X7675,ANI,2,
    002212,5X7575'BOCM
200 DATA ANJ,3,002423,X05455,X05657,
    ANK,2,002413,X05557'BVDG
210 DATA ANL,2,002100,54645X,ANM,3,
    X04200,X04455,X07677'BVPH
220 DATA ANN,2,X02523,X05658,ANO,2,
    5453XX,5X5656'BOJH
230 DATA ANP,3,X4322X,5432XX,XX3221,
    ANQ,2,X03021,5X5665'BVPK
240 DATA ANR,3,2312XX,X3424X,XX1212,
    ANS,2,X0122X,X07645'BVWL
250 DATA ANT,2,X0102X,X05645,ANU,3,
    X0100X,545445,X07887'BVOL
260 DATA ANV,3,X00000,X05433,X07787,
    ANW,2,X05422,5X5677'BVJM
270 DATA ASA,2,113331,688766,ASB,2,
    113131,686796,ASC,2,113321,
    688666'BJSP
280 DATA ASD,2,113121,686696,ASE,2,
    113231,68776X'BOKM
290 DATA ASF,3,113341,XX3346,668866,
    ASG,2,113141,686866,ASH,2,113333,
    6X8786'BQMT
300 DATA ASI,2,113023,6X8686,ASJ,3,
    110111,X5656X,6X6768'BVUH
310 DATA ASK,2,6465XX,686668,ASL,3,
    110211,6575XX,XX8565'BVJJ
320 DATA ASM,2,110011,655566,ASN,3,
    110121,65666X,686769'BVSJ
330 DATA ASO,3,110101,6564XX,6X6767,
    ASP,3,X5433X,6543XX,XX4332'BDBM
340 DATA ASQ,2,X14132,6X6776,ASR,3,
    3423XX,X1202X,XX2323'BVGM
350 DATA ASS,3,X1233X,XX8756,6787XX,
    AST,2,X1213X,XX6756'BVON
360 DATA ASU,3,010110,656556,XX8998,
    ASV,3,011111,6X6544,X88898'BDCP
370 DATA ASW,3,110113,6X6533,
    6X6788'BBPK
380 DATA BNA,2,224442,799877,BNB,2,
    221202,224242'BOBN
390 DATA BNC,2,224432,799777,BND,2,
    220202,224232'BOBO
400 DATA BNE,3,224342,79887X,XX9876,
    BNF,3,224452,XX4457,779977'BDHK
410 DATA BNG,3,222200,224252,797977,
    BNH,3,22110X,224444,7X9897'BDNK
420 DATA BNI,3,220102,224434,799797,
    BNJ,3,221222,X6767X,XX7677'BDSM
430 DATA BNK,3,220222,7576XX,797779,
    BNL,3,X2132X,7686XX,XX9676'BDMN
440 DATA BNM,3,221122,766677,XX9899,
    BNN,2,X2123X,76777X'BVHM
450 DATA BNO,3,X2121X,7675XX,7X7878,
    BNP,3,X2100X,3210XX,XX5443'BDJQ
460 DATA BNQ,3,X01003,X25243,7X7887,
    BNR,3,1201XX,X2313X,XX0101'BDRQ
470 DATA BNS,2,X2344X,XX9867,BNT,2,
    X2324X,XX7867'BOSO
480 DATA BNU,2,121221,767667,BNV,2,
    111111,7X7655'BOAO
490 DATA BNW,3,221224,7X7644,
    7X7899'BBCN
500 DATA CNA,2,332010,335553,CNB,2,
    332310,335353'BOFH
510 DATA CNC,2,33101X,335543,CND,2,
```

# GUITAR CHORD

```
    33131X,335343'BOKI
520 DATA CNE,2,332000,335453,CNF,2,
    333011,335563'BONJ
530 DATA CNG,2,33331X,335363,CNH,2,
    332210,335555'BONK
540 DATA CNI,2,33121X,335545,CNJ,3,
    332333,X7878X,XX8788'BVNN
550 DATA CNK,2,331333,8687XX,CNL,2,
    X3243X,8797XX'BOFN
560 DATA CNM,2,332233,877788,CNN,2,
    X3234X,87888X'BONO
570 DATA CNO,3,X3232X,8786XX,8X8989,
    CNP,3,X3211X,4321XX,XX6554'BDKT
580 DATA CNQ,3,X1211X,X36354,8X8998,
    CNR,3,2312XX,X3424X,XX1212'BDHT
590 DATA CNS,1,X3455X,CNT,2,X3435X,
    XX8978,CNU,2,232332,878778'BCNU
600 DATA CNV,2,333333,8X8766,CNW,2,
    332335,8X8755'BOJJ
610 DATA CSA,2,443121,446664,CSB,2,
    44342X,446464'BODJ
620 DATA CSC,1,446654,CSD,2,44242X,
    446454,CSE,2,443111,446564'BCCN
630 DATA CSF,2,446674,XX6679,CSG,2,
    44442X,446474'BODM
640 DATA CSH,2,X4332X,446666,CSI,2,
    44232X,44X656'BOAN
650 DATA CSJ,2,443444,X8989X,CSK,2,
    442444,9798XX'BOHO
660 DATA CSL,1,X4354X,CSM,2,443344,
    988899,CSN,2,X4345X,98999X'BCRS
670 DATA CSO,2,X4343X,9897XX,CSP,3,
    X4322X,5432XX,XX3221'BVVS
680 DATA CSQ,2,X2322X,X47465,CSR,3,
    3423XX,X1202X,XX2323'BVRT
690 DATA CSS,1,X4566X,CST,1,X4546X,
    CSU,2,343443,989889'BUPT
700 DATA CSV,2,444444,9X9877,CSW,2,
    443446,9X9866'BOQK
710 DATA DNA,2,X00232,557775,DNB,2,
    X00212,557575'BOCK
720 DATA DNC,2,X00231,557765,DND,2,
    X00211,557565'BOCL
730 DATA DNE,2,X00222,557675,DNF,2,
    X00233,557785'BOOM
740 DATA DNG,2,X00213,557585,DNH,2,
    X00202,557777'BOPN
750 DATA DNI,2,X00201,55X767,DNJ,2,
    X00210,554555'BOLP
760 DATA DNK,2,X00210,553555,DNL,2,
    X04220,X5465X'BOXQ
770 DATA DNM,1,554455,DNN,1,X5456X,
    DNO,1,X5454X'BNMR
780 DATA DNP,3,X5433X,6543XX,XX4332,
    DNQ,2,X3433X,X58576'BVJU
790 DATA DNR,3,1201XX,X2313X,XX0101,
    DNS,1,X5677X,DNT,1,X5657X'BCMW
800 DATA DNU,2,XX0110,454554,DNV,2,
    X00010,555555,DNW,1,554557'BCAN
810 DATA DSA,2,665343,668886,DSB,2,
    66564X,668686'BOBL
820 DATA DSC,2,XX4342,668876,DSD,2,
    66464X,668676'BOMN
830 DATA DSE,2,665333,668786,DSF,2,
    X6634X,668896'BOLO
840 DATA DSG,2,66664X,668696,DSH,2,
    X6554X,668888'BOJP
850 DATA DSI,2,66454X,66X878,DSJ,1,
    665666,DSK,1,664666'BUAR
860 DATA DSL,2,XX1031,X6576X,DSM,2,
    XX1011,665566,DSN,2,XX1022,
    X6567X'BJMW
870 DATA DSO,2,XX1020,X6565X,DSP,3,
    X2100X,3210XX,XX5443'BVSU
880 DATA DSQ,2,X4544X,X69687,DSR,3,
    2312XX,X3424X,XX1212'BVMV
890 DATA DSS,2,XX1243,X6788X,DST,2,
    XX1223,X6768X'BOYU
900 DATA DSU,2,XX1221,565665,DSV,2,
    X11121,666666,DSW,1,665668'BCLP
910 DATA ENA,3,022100,076454,079990,
    ENB,3,022130,076750,079797'BDCP
920 DATA ENC,3,022000,0X5453,079987,
    END,3,022030,0X5430,079787'BDRQ
930 DATA ENE,3,021100,076444,079897,
    ENF,2,022200,077450'BVAP
940 DATA ENG,2,020200,0X2435,ENH,3,
    022120,076650,079999'BVHR
950 DATA ENI,3,022020,07565X,07X989,
    ENJ,2,020132,076770'BVGS
960 DATA ENK,2,022032,075770,ENL,3,
    021102,074444,076870'BVBT
970 DATA ENM,2,022122,076677,ENN,2,
    022133,076780'BOWS
980 DATA ENO,2,0X0101,07676X,ENP,3,
    032110,4321XX,0X6554'BVGV
990 DATA ENQ,2,0X0110,05655X,ENR,3,
    3423XX,012020,0X2323'BVUW
1000 DATA ENS,3,0121X0,0X2354,078990,
     ENT,2,0101X0,07879X'BVSD
1010 DATA ENU,2,0X2332,676776,ENV,2,
     022232,077777'BORC
1020 DATA ENW,2,0X0122,0X6779'BTMY
1030 DATA FNA,2,133211,887565,FNB,2,
     131241,88786X'BOIE
1040 DATA FNC,2,133111,X33564,FND,2,
     131141,X33544'BOOF
1050 DATA FNE,2,1X3210,087555,FNF,2,
     113311,X8856X'BOQH
1060 DATA FNG,2,131311,88886X,FNH,2,
     1X3231,X8776X'BOVI
1070 DATA FNI,2,133131,88676X,FNJ,3,
     101011,XX3543,887888'BVOK
1080 DATA FNK,3,131113,XX3543,886888,
     FNL,3,103010,X85555,X8798X'BDRN
1090 DATA FNM,3,100011,XX3233,887788,
     FNN,3,131214,XX3244,X8789X'BDRO
1100 DATA FNO,3,1X1212,XX3242,X8787X,
     FNP,3,X4322X,5432XX,XX3221'BDFH
1110 DATA FNQ,2,1X1221,X6766X,FNR,5,
     1201XX,X2313X,XX0101,XX3434,
     X5646X'BKQJ
1120 DATA FNS,2,12320X,XX3465,FNT,2,
     12120X,XX3445'BOMF
1130 DATA FNU,3,101001,XX3443,787887,
     FNV,2,X33343,888888,FNW,1,
     1X1233'BJMK
1140 DATA FSA,2,244322,998676,FSB,2,
     242352,99897X'BOQG
1150 DATA FSC,2,244222,X44675,FSD,2,
     242252,X44655'BOVH
```

# GUITAR CHORD

```
1160 DATA FSE,2,24332X,998666,FSF,2,
     224422,X9967X'BOGJ
1170 DATA FSG,2,242422,99997X,FSH,2,
     2X4342,X9887X'BOBK
1180 DATA FSI,2,244242,99787X,FSJ,3,
     XX2122,XX4654,998999'BVDM
1190 DATA FSK,3,242224,XX4254,997999,
     FSL,2,XX4121,X96666'BVTN
1200 DATA FSM,3,211122,XX4344,998899,
     FSN,2,21222X,242325'BVWF
1210 DATA FSO,3,2X2323,XX4353,
     X9898X'BBDC
1215 DATA FSP,5,X5433X,6543XX,XX4332,
     X9877X,XX8776'BPOL
1220 DATA FSQ,2,2X2332,X7877X,FSR,5,
     2312XX,X3424X,XX1212,5645XX,
     X6757X'BKHL
1230 DATA FSS,2,2343XX,XX4576,FST,2,
     2323XX,XX4556'BOSH
1240 DATA FSU,3,212112,XX4554,898998,
     FSV,3,2X2100,X44454,999999'BDEL
1250 DATA FSW,1,2X2344,GNA,3,320003,
     320033,355433,GNB,2,320001,
     353463'BJQM
1260 DATA GNC,2,355333,X55786,GND,2,
     353363,X55766'BOFK
1270 DATA GNE,2,XX5432,35443X,GNF,2,
     3X0013335533'BNCL
1280 DATA GNG,2,3X301X,353533,GNH,2,
     320000,3X5453'BOCM
1290 DATA GNI,1,3X5353,GNJ,2,X2323X,
     XX3233,GNK,2,3132XX,353335'BCHQ
1300 DATA GNL,2,32423X,XX5232,GNM,2,
     322233,XX5455'BOWF
1310 DATA GNN,2,32333X,353436,GNO,2,
     32310X,3X3434'BOAG
1320 DATA GNP,6,X2100X,3210XX,XX5443,
     X6544X,7654XX,XX9887'BWLJ
1325 DATA GNQ,2,3X3443,X8988X'BTJI
1330 DATA GNR,6,3423XX,X1202X,XX2323,
     6756XX,X4535X,XX5656'BWFK
1340 DATA GNS,2,XX4312,XX5687,GNT,2,
     34340X,XX5667'BOFJ
1350 DATA GNU,2,323223,XX5665,GNV,2,
     3X3211,X55565'BONK
1360 DATA GNW,2,3X3200,3X3455'BTIG
1370 DATA GSA,2,XX1114,466544,GSB,2,
     XX1112,464574'BOGM
1380 DATA GSC,2,466444,X66897,GSD,2,
     466474,X66877'BONN
1390 DATA GSE,2,XX6543,46554X,GSF,3,
     XX1124,446644,XX6899'BVTQ
1400 DATA GSG,3,XX1122,464644,XX6879,
     GSH,2,XX1111,4X6564'BVGI
1410 DATA GSI,2,XX1101,4X6464,GSJ,2,
     X3434X,XX4344'BOCH
1420 DATA GSK,2,464446,XX6476,GSL,2,
     43534X,XX6343'BOGI
1430 DATA GSM,2,433344,XX6566,GSN,2,
     43444X,464547'BOMJ
1440 DATA GSO,2,4342XX,4X4545'BTCF
1450 DATA GSP,5,X3211X,4321XX,XX6554,
     X7655X,8765XX'BPWM
1460 DATA GSQ,1,4X4554,GSR,6,1201XX,
     X2313X,XX0101,4534XX,X5646X,
     XX3434'BKJR
1470 DATA GSS,2,XX6534,4565XX,GST,3,
     XX4534,4545XX,XX6778'BVHP
1480 DATA GSU,2,434334,XX6776,GSV,2,
     4X4322,X66676'BOSO
1490 DATA GSW,2,4X4311,4X4566,*'BVDL
1500 LL=40:REM LINE LENGTH,
     FOR VIC=22'CAVF
1510 GOTO 2650'BEKA
1520 WI$="[SHFT -6]":FR$="[CMDR Q,
     SHFT +4,CMDR W]":NUT$="[CMDR A,
     CMDR R4,CMDR S]"'DMJT
1530 DIM C$(24):LC$=""'CKQE
1540 VT$="[HOME,DOWN26]"'BDBF
1550 BL$="[SPACE40]"'BDYJ
1560 REM CHORD TYPES'BKWH
1570 C$(1)="MAJOR"'BFZI
1580 C$(2)="7TH"'BFNI
1590 C$(3)="MINOR"'BFNK
1600 C$(4)="MIN 7TH"'BFWC
1610 C$(5)="MAJ 7"'BFJC
1620 C$(6)="SUS 4"'BFRD
1630 C$(7)="7 SUS 4"'BFAF
1640 C$(8)="6TH"'BFSF
1650 C$(9)="MIN 6"'BFYG
1660 C$(11)="MIN 9"'BGNI
1670 C$(10)="9TH"'BGMI
1680 C$(12)="MAJ 9"'BGCK
1690 C$(13)="6/9"'BGKK
1700 C$(14)="7 AUG 9"'BGVD
1710 C$(15)="7 DIM 9"'BGTE
1720 C$(16)="AUG"'BGBE
1730 C$(17)="7 AUG 5"'BGUG
1740 C$(18)="DIM"'BGAG
1750 C$(19)="DIM 5"'BGHI
1760 C$(20)="7 DIM 5"'BGLJ
1770 C$(21)="9 DIM 5"'BGOK
1780 C$(22)="11TH"'BGHK
1790 C$(23)="13TH"'BGKL
1800 C$(24)=""'BGHC
1810 REM MAIN ROUTINE'BLRF
1820 CN$="":PRINT"[CLEAR]";'CFJG
1830 GOSUB 2570'BEPF
1840 PRINT"[HOME,RVS]ENTER ROOT
     (A-G)"'BALJ
1850 GOSUB 2500:IF X$="Q"THEN PRINT"
     [CLEAR]":END'GINM
1860 IF X$<"A"OR X$>"G"THEN 1830'FIWM
1870 CN$=X$'BFBJ
1880 PRINT LEFT$(VT$,18)CN$'CLBM
1890 GOSUB 2570'BEPL
1900 PRINT"[HOME,RVS] [RVOFF]S[RVS]
     HARP [RVOFF]F[RVS]LAT [RVOFF]N
     [RVS]ATURAL ?"'BAGK
1910 GOSUB 2500:IF X$="S"OR X$="F"OR
     X$="N"THEN 1930'IPVM
1920 GOTO 1890'BEPF
1930 IF CN$="B"AND X$="S"THEN
     1820'FJPK
1940 IF CN$="E"AND X$="S"THEN
     1820'FJSL
1950 IF CN$="C"AND X$="F"THEN
     1820'FJDM
1960 IF CN$="F"AND X$="F"THEN
     1820'FJGN
1970 REM ALLOW SHARPS ONLY'BPHO
```

# GUITAR CHORD

```
1980 IF X$="F"AND CN$="A"THEN X$="S"
     :CN$="G"'HLFS
1990 IF X$="F"THEN X$="S"
     :CN$=CHR$(ASC(CN$)-1)'IQMU
2000 PRINT LEFT$(VT$,18)CN$'CLBW
2010 CN$=CN$+X$'CIPX
2020 P$="":IF X$="S"THEN
     P$="SHARP"'FHNC
2030 PRINT LEFT$(VT$,18)TAB(2)P$'DMJB
2040 GOSUB 2570'BEPY
2050 REM CHOOSE CHORDS'BMTD
2060 PRINT"[HOME,RVS]"LEFT$(BL$,LL)
     :PRINT"[HOME,RVS] ENTER LETTER
     :[DOWN]"'DJQI
2070 FOR I=1 TO 12'DEED
2080 PRINT"[RVS]"CHR$(64+I)"[RVOFF]
     : "C$(I)TAB(LL/2)"[RVS]
     "CHR$(76+I)"[RVOFF]: "C$(I+12)
     :NEXT'JCWP
2090 GOSUB 2500:IF X$=CHR$(13)THEN
     2150'FPYJ
2100 IF X$<"A"OR X$>"X"THEN 2040'FIIA
2110 PRINT LEFT$(VT$,18)TAB(8)C$(ASC
     (X$)-64)'FUUD
2120 CN$=CN$+X$'CIPA
2130 GOSUB 2570'BEPY
2140 PRINT"[HOME,RVS]PLEASE WAIT"'BAOC
2150 PRINT LEFT$(VT$,3);
     :FOR I=1 TO 12'FNIG
2160 PRINT LEFT$(BL$,LL-1):NEXT'EKQF
2170 REM CHORD SEARCH'BLFF
2180 GOSUB 2590'BERE
2190 IF N$<>"*"THEN 2230'EGYH
2200 PRINT"[HOME,RVS]"LEFT$(BL$,LL)
     :PRINT"[HOME,RVS]RETURN OR
     'Q'"'DJAD
2210 GOSUB 2500:IF X$="Q"THEN PRINT"
     [CLEAR]":END'GIND
2220 GOTO 1820'BEIY
2230 NC=1:READ CH$'CHCB
2240 GOSUB 2530:PRINT LEFT$(VT$,
     4)LEFT$(BL$,6)'ETHG
2250 FOR I=1 TO 6:IF VAL(MID$(CH$,I,
     1))>5 THEN 2350'IUJK
2260 NEXT'BAEC
2270 REM 1ST POSITION CHORDS'BRII
2280 PRINT LEFT$(VT$,5)NUT$"
     [BACK ARROW]NUT"'CLKJ
2290 FOR I=1 TO 6'DDJH
2300 IF MID$(CH$,I,1)="0"THEN PRINT
     LEFT$(VT$,4)TAB(I-1)"O"
     :GOTO 2330'JYRI
2310 IF MID$(CH$,I,1)="X"THEN PRINT
     LEFT$(VT$,4)TAB(I-1)"X"
     :GOTO 2330'JYQJ
2320 PRINT LEFT$(VT$,4+2*VAL(MID$(CH$,
     I,1)))TAB(I-1)"[SHFT Q]"'IWUJ
2330 NEXT:GOTO 2440'CFPC
2340 REM HIGHER UP THE NECK'BPLF
2350 MN=24:FOR I=1 TO 6
     :X=VAL(MID$(CH$,I,1))'HVFL
2360 IF X<>0 THEN IF X<MN THEN
     MN=X'IIEK
2370 NEXT I'BBCE
2380 PRINT LEFT$(VT$,5)TAB(6)"
     [BACK ARROW]"MN-1"[LEFT,SPACE2]
     "'EMBL
2390 FOR I=1 TO 6'DDJI
2400 IF MID$(CH$,I,1)="0"THEN PRINT
     LEFT$(VT$,4)TAB(I-1)"O"
     :GOTO 2430'JYSJ
2410 IF MID$(CH$,I,1)="X"THEN PRINT
     LEFT$(VT$,4)TAB(I-1)"X"
     :GOTO 2430'JYRK
2420 PRINT LEFT$(VT$,6+2*(VAL(MID$
     (CH$,I,1))-MN))TAB(I-1)"[SHFT Q]
     "'JBRM
2430 NEXT'BAEB
2440 IF NC<>HM THEN PRINT"[HOME,RVS]
     <RET> TO CONT.":GOSUB 2500
     :IF X$=CHR$(13)THEN 2480'KULQ
2450 IF NC<>HM THEN GOTO 2440'FIPI
2460 PRINT"[HOME,RVS]RETURN OR 'Q'
     [SPACE9]":GOSUB 2500
     :IF X$=CHR$(13)THEN GOTO
     1820'HQOQ
2470 PRINT"[CLEAR]":END
2480 NC=NC+1:READ CH$:GOTO 2240'EOTL
2490 REM INPUT'BFFJ
2500 GET X$:IF X$=""THEN 2500'EJAD
2510 RETURN'BAQA
2520 REM DRAW NECK'BIVD
2530 PRINT LEFT$(VT$,5);'CICF
2540 FOR I=1 TO 6:PRINT FR$:PRINT WI$
     :NEXT'GMEJ
2550 RETURN'BAQE
2560 REM BLANK'BFVG
2570 PRINT"[HOME,RVS]"LEFT$(BL$,LL)
     :RETURN'DJVK
2580 REM READ CHORDS'BKJK
2590 IF CN$<=LC$THEN RESTORE'FGNM
2600 READ N$:IF N$="*"THEN RESTORE
     :RETURN'GGIF
2610 IF CN$=N$THEN LC$=CN$:READ HM
     :RETURN'GPQI
2620 GOTO 2600'BEFD
2630 REM CHORD DATA'BJZG
2640 REM TITLES'BGYG
2650 PRINT"[CLEAR]"'BATG
2660 REM OMIT NEXT 2 LINES FOR VIC,
      C64'BYKN
2670 SC=32768:FOR I=SC TO SC+LL-1
     :POKE I,224:POKE I+960,224
     :NEXT'KHHU
2680 FOR I=SC+LL TO SC+920 STEP LL
     :POKE I,224:POKE I+LL-1,224
     :NEXT'LDTV
2690 PRINT"[HOME,DOWN4]"'BAOJ
2700 PRINT TAB(9)"[SPACE2,SHFT O,
     CMDR T] [CMDR @,CMDR M,SPACE6,
     SHFT L]"'CCAH
2710 PRINT TAB(9)"[SPACE2,SHFT L,
     CMDR @,SHFT @6,SHFT M,SHFT N,
     SHFT L4,SHFT N,SHFT M]"'CCGQ
2720 PRINT"[HOME,DOWN10]"TAB(13)"[RVS]
     GUITAR CHORDS"'CDHJ
2730 PRINT"[HOME,DOWN12]
     "TAB(25)"ANDY GAMBLE"'CDSJ
2740 PRINT"[DOWN6]"TAB(8)"[RVS]
     PRESS ANY KEY TO CONTINUE"'CCQO
2750 GOSUB 2500:GOTO 1520'CJWI
```

BY DONALD J. EDDINGTON

# A Round with Voices/Choices for the VIC 20

Let's everyone gather around your VIC 20, and get ready for a round—the old sing-along favorite, "Row, Row, Row Your Boat"! You are the maestro at this concert; you decide which voice leads and which voice will end the round. So take baton in hand, push a few letters on the keyboard, and lead your VIC 20 in a rousing rendition of "Row, Row Row Your Boat"!!

## Getting It Started

The idea for this program came to me from reading in the *VIC 20 Programmer's Reference Guide* about making music with the VIC 20. All of the programs in that manual used only one voice, but it was hinted that three-voice music is possible. So, for several days I tried to get three-voice music out of the VIC. I found even two-voice music was difficult to get working. Getting the two voices to play together was a real problem. Either the voices would get out of step, or else the prototype program played the music only in block chords. It could not play a long note against several short notes. When I tried taking out all silences (rests) in the music, I got the long notes, but then could not play any repeated notes.

While experimenting with a way to put the rests back into the tune without losing the long notes, I finally got a simple two-voice tune coded and running right. Then I tried adding a third voice. That gave me very little further trouble. Now that I had found a way to put rests between repeated notes but still allow for long notes, I decided to code a three-part round for the VIC 20.

## Row, Row Round

I chose the "Row, Row" round because it is a familiar piece, yet very few people have heard it in all six forms. At first, I could get VIC to play only one form of it, but I later added to the program so that it could play all six variations. However, my main concern at this point was just getting the round running and playing. This was done by breaking all notes—long or short—into shorter notes. Rests were formed by using note values of zero to silence the correct voices. In this way, I got the three-voice round program to play one of the six variations quite well.

## Voices/Choices Program

Once I had all three voices playing well, I decided to make the program let you, the user, determine the order of the entry of the voices to the round. By setting each voice number to a variable, then assigning the variables to three-letter input strings (like HML or MLH), I let the user select the variation he wanted to hear!! He could hear the soprano-tenor-bass variation with the HML input string by typing this string then the RETURN key For visual interest, each variation has its own border and screen color combination. Finally, the END string will give you a video show when you tire of the music portions of the program.

## How It Works

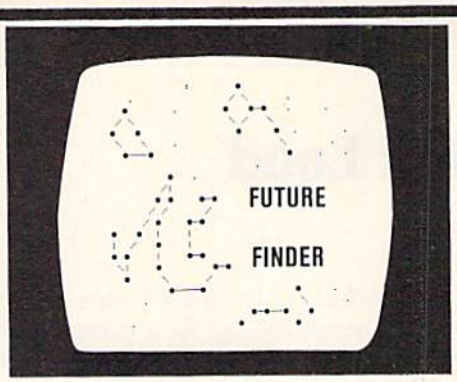
The screen is filled with descriptions and instructions about the program. Seven input strings are printed, with an explanation of what each one does. The VIC waits for your input. Any input which does not match one of the input strings exactly is rejected.

Matching input either sets the three voices so that they enter the round as you directed or invokes the END sequence. The screen and border colors are set; the VIC prints "(your selection) NOW PLAYING!" and plays the round variation you selected. When the round ends, the screen and border colors revert to starting (standard) colors. Then, the VIC asks for more input. If you select the END string for input, the VIC will put on a little video show for you, then end the program. C

```
10 REM VOICES/CHOICES PROGRAM SCORED
   BY D.J.EDDINGTON
20 PRINT"[CLEAR,PURPLE,RVS]ROW,ROW,
   ROW YOUR BOAT A ROUND IN THREE
   PARTS"
30 PRINT"[WHITE,RVS]SING ALONG IF YOU
   WISH[SPACE2]--OR JUST LISTEN--
   [SPACE2]"
40 C=36879:POKE C,27
100 REM DEFINE VOICES
110 PRINT"[RED,RVS]YOU GET TO CHOOSE
    THE[SPACE2]ENTRY OF THE VOICES
    [SPACE2]"
112 H=36876:M=36875:L=36874:V=36878
113 PRINT"[BLACK]TYPE ONE OF THE
    FOLLOWING LETTER GROUPS:[DOWN]"
114 PRINT"[RVS,RED]HML[RVOFF]
     = HIGH MIDDLE LOW [RVS]HLM[RVOFF]
     = HIGH LOW MIDDLE"
115 PRINT"[RVS]LMH[RVOFF]
     = LOW MIDDLE HI
116 PRINT"[RVS]LHM[RVOFF]
     = LOW HIGH MIDDLE [RVS]MHL[RVOFF]
     = MIDDLE HIGH LOW"
117 PRINT"[RVS]MLH[RVOFF]
     = MIDDLE LOW HIGH"
    :PRINT"[RVS]END[RVOFF] = END
    [SHFT SPACE]OF PROGRAM[PURPLE,
    DOWN]"
120 INPUT X$
125 IF X$="HML"THEN S1=H:S2=M:S3=L
    :POKE C,60:GOTO 200
```

# COMPUTER TUTOR

```
130 IF X$="HLM"THEN S1=H:S2=L:S3=M
    :POKE C,234:GOTO 200
135 IF X$="LMH"THEN S1=L:S2=M:S3=H
    :POKE C,90:GOTO 200
140 IF X$="LHM"THEN S1=L:S2=H:S3=M
    :POKE C,138:GOTO 200
145 IF X$="MHL"THEN S1=M:S2=H:S3=L
    :POKE C,156:GOTO 200
150 IF X$="MLH"THEN S1=M:S2=L:S3=H
    :POKE C,174:GOTO 200
153 IF X$="END"THEN FOR T=1 TO 90
    :PRINT"[DOWN,SPACE4,RED]
    THAT'S ALL!!";:POKE C,T:NEXT
154 IF X$="END"THEN PRINT"[CLEAR]":END
155 GOTO 20
200 REM PLAY NOTES OF THE ROW-ROW
    ROUND
205 PRINT"[BLACK,RVS] "X$;
    " NOW PLAYING!":X=200:Y=-100
210 POKE V,10
220 READ P,Q,R
230 IF P=0 THEN P=Y
235 IF Q=0 THEN Q=Y
240 IF R=0 THEN R=Y
250 IF P=-1 THEN POKE S1,0:POKE S2,0
    :POKE S3,0:RUN
260 READ D
270 POKE S1,P+X:POKE S2,Q+X
    :POKE S3,R+X
275 FOR N=1 TO D*9:NEXT N:GOTO 220
400 REM NOTES FOR THE ROW-ROW ROUND
    FOLLOW
410 DATA 25,0,0,29,0,0,0,1,25,0,0,29,
    0,0,0,1
415 DATA 25,0,0,20,28,0,0,10,31,0,0,
    29,0,0,0,1
420 DATA 31,25,0,20,28,25,0,9,28,0,0,
    1,31,25,0,20,32,25,0,10
425 DATA 32,0,0,1,35,25,0,20,35,28,0,
    10,35,31,0,29,0,0,0,1
430 DATA 40,31,25,10,0,31,25,10,40,28,
    25,9,40,28,0,1
435 DATA 35,31,25,10,0,31,25,10,35,32,
    25,9,35,32,0,0
440 DATA 31,35,25,10,0,35,25,10,31,35,
    28,10
445 DATA 25,35,31,10,0,35,31,10,25,35,
    31,9,25,35,0,1
450 DATA 35,40,31,10,35,0,31,10,32,40,
    28,10,31,35,31,10,31,0,31,10,28,
    35,32,10
455 DATA 25,31,35,10,25,0,35,10,25,31,
    35,10,25,25,35,10,25,0,35,10,25,
    25,35,10
460 DATA  0,35,40,10,0,35,0,10,0,32,
    40,10,0,31,35,10,0,31,0,10,0,28,
    35,10
465 DATA 0,25,31,10,0,25,0,10,0,25,31,
    10,0,25,25,10,0,25,0,10,0,25,25,10
470 DATA 0,0,35,20,0,0,32,10,0,0,31,
    20,0,0,28,10,0,0,25,60,-1,-1,-1
```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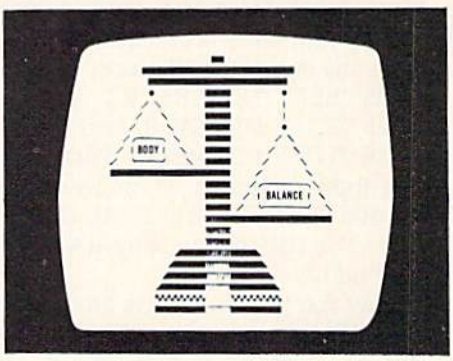


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Circle Reader Service No. 5

BY JERRY A. STURDIVANT

# Quick Load

Here is a technique for quick program loading. No more loading the wedge just for a couple of programs. No more having to run your cursor over and add a comma and an eight and a colon (or space bar until the 'PRG' is gone). Or trying to remember if you are supposed to add a "comma one" or not.

This technique follows the closing quote in the program title of your directory with the items necessary for a Quick Load: either a colon, a comma eight and a colon, or a comma eight/comma one (no colon needed after this). When your directory comes up on the screen, it can look like any one of the following:

25 "REMOTE ADRS",8,1: PRG
25 "TITLE FOR 64",8: PRG
25 "TITLE FOR PETS": PRG

To load the above programs, all you have to do is go to the program title line and put in LOAD (or L shifted O) and hit return. The bottom line is for BASIC 4.0, which will use D shifted L.

It is all in how you save it. Here is how it is done.

Enter a one-line program such as 10 REM. To save the program, get on a clear line and type SAVE, or the popular S and shifted A. Then type a quote.

Under normal circumstances, you would be able to make the program title up to 16 characters long. This technique will limit your title to 14 characters or less, depending on what you wish to place after the last quote.

Enter a program title, in this case letters A through L (12 letters). Now hold down the shift key and hit the space bar. This puts in a shifted space.

Then hold down your Commodore logo key (the one with the C= on it) and press the D key then the U key. Release the Commodore key. Now hold down the shift key and press the @ key. Release the shift key.

Hit a quote, then a comma, then an eight. There should be a total of 16 characters between the quotes. Now hit return. Your program will save.

Bring up your directory and take a look. You should have this:

1 "ABCDEFGHIJKL",8: PRG

If you wish to have a "comma one" after the "comma eight", you will be limited to 11 or less characters in your program name. The procedure is the same as above except after pushing the D and U keys, also press the D key again and then the E key. This will add the comma one. You will not need the colon.

You can easily change your present directory by using the disk command RENAME.

## What's Happening?

You are limited to sending 16 characters to your disk for the title of a program. The 16 locations, set aside on your disk for the title, have the number 160 in them.

*To load a program from disk using this technique, all you do is go to the program title line, type LOAD and hit RETURN.*

When you send a title less than 16 characters long to the disk, the remaining unused places still hold the number 160. When you ask your disk drive to show you what is on the disk, it starts sending the 16 characters to your computer to put on the screen.

The disk drive sends the characters until it sees a number 160. When it sees the 160, it thinks it has reached the end of the title and instead of sending a character 160, it sends a quote. Then for every 160 after that it subtracts 128, which sends a 32. A 32 is a space.

If your title is two words, then you must have hit the space bar between the words when you made the title. A space bar is a number 32.

As it happens, a shifted space is a 160. So when the disk drive is sending the title and sees the 160 (the shifted space we put in) it sends a quote, then it subtracts 128 from the remaining characters and sends them. But rather than 32's (spaces), it sends the characters we put in, minus 128. The logo D we sent comes back as a comma. The U comes back as an eight, the E as a one and the @ as a colon.

## The PET

If you have a PET, you can have a colon after the quote in the program title, which is all you need for BASIC 4.0.

Again, you can send no more than 16 characters to the disk so you will be limited to a 14-character title or less.

In place of typing SAVE, you can type DSAVE or D shift S, then a quote. After your fourteenth character or less, hold down the shift key and hit the space bar (this will give you a quote when it comes back) then release the shift key.

Now hit the colon and return. The program will save and come back with the colon after the second quote.

If you are saving a program for someone with a Commodore 64 and wish to add the comma eight, here is how. Enter a D, a shifted S and a quote. Enter the title (12 characters or less) and a shifted space. Now hold down the shift key and press the comma, then the eight (and the comma and one if you wish those, but the title will be limited to 11 characters or less). Release the shift key and hit return to save the program. C

BY ANDY GAMBLE

# Sprite Catalog

I freely admit it: I am no artist. When a friend turns out a useful sprite, I often jot down the data for use in my own programs. As a result, it occurred to me that it would be great if there were a list, a library or a catalog of sprites readily available for anyone to use. Enter, stage left, this program and the accompanying challenge to readers.

SPRITECAT maintains a catalog of sprites on a disk in sequential files. You can also create a new sprite by entering data numbers, edit that data and so change the sprite, change sprite color and screen colors, use multicolor, expand the sprite and print a hard copy.

But that's only half the battle. The good part is where you join in! I would like to have readers submit sprites they have created and are willing to share with others. Periodically we'll publish the best sprites in *Power/Play* and you'll be able to choose from the "Sprite Catalog" those sprites which seem most useful to you, and keep them on disk for your personal library. Need a pointing hand? Don't draw it, load it! Need a wheel? Don't reinvent it.

First, an explanation of SPRITECAT. The program is entirely menu-driven and thus, easy to use. The top line of the screen is reserved for the set of commands available. Pressing "H" for help gets you a description of all these commands.

*Entering New Data*: Select "N" and simply type the 63 numbers needed to define a sprite, pressing RETURN after each one, of course. You will see the sprite grow on the left of the screen as you type. The format for these 63 numbers is always 21 rows of three numbers. Numbers out of the correct range (zero to 255) will be rejected. If you make a mistake in entering the number, there are two ways to correct it. If you have already pressed the RETURN key after the number, see the section on editing. Otherwise, pressing the asterisk will erase that faulty number. Pressing RETURN without typing a number is a fast way to enter zeros. The program returns to the menu after all 63 numbers have been input.

*Editing Sprite Data*: "E" will put you in the edit mode. The first piece of data will be highlighted in reverse video. Hold down or press the space bar until the number you wish to change is highlighted, and press RETURN. The correct number can now be entered (on the command line).

*Expansion*: The "X" and "Y" keys expand and contract in the X and Y directions.

*Multicolor*: Select "M" and another menu will appear. A second "M" turns on the multicolor. The sprite color, background color and the two multicolors can be changed by the C, B, zero and one keys respectively. "R" takes you back to the main menu.

*Saving to Disk*: The "S" key gives you a prompt for the filename and saves the sprite to disk. Any disk errors will be reported on the command line.

*Checking the Disk Directory*: The directory can be viewed by selecting "D."

*Loading a Sprite:* Select "L" and enter the file name from the disk directory.

*Printing a Sprite*: Press "P" for a paper printout of the sprite and data numbers.

*Quitting the Program*: Do it gracefully by the "Q" key!

The best way to use a sprite from the catalog in your own program is the usual way: type the numbers as data to be read in your program. It is, of course, possible to get them directly from the sequential files using this short routine:

```
INPUT "FILENAME";FL$:OPEN 1,8,4,FL$+",S,R"
FOR I=1 TO 63:INPUT #1;SD:POKE 703+I,SD:NEXT I
```

This will put the sprite data into block 11 (locations 704 to 766). Change it according to your needs.

That's all there is to it. Not that I am suggesting that you should just lie back and let the sprites come rolling in! All this demands your participation. If you have sprites that you're proud of, send them in. We'll publish the best entries and award the authors a free year's subscription. C

*Send your sprites to: Sprite Catalog, c/o* Power/Play, *Contemporary Marketing, Inc., 1200 Wilson Drive, West Chester, PA 19380.*

*Sequential files on disk in the SPRITECAT format are required, and disks cannot be returned. Please don't send whole programs. Use a ".M" on the end of the file name to indicate a multicolor sprite (e.g., RAINBOW.M).*

```
100 REM SPRITECAT'BJLX
110 REM ANDY GAMBLE  SEPT 1984'BSQB
130 CU$="[LEFT13]"'BDPH
140 BL$="[RVS,SPACE40]"'BDRF
150 CL$="[RVS,SHFT L,SPACE2,SHFT M,
    SPACE2,SHFT X,SPACE2,SHFT Y,
    SPACE2,SHFT N,SPACE2,SHFT D,
    SPACE2,SHFT S,SPACE2,SHFT C,
    SPACE2,SHFT Q,SPACE2,SHFT E,
    SPACE2,SHFT P,SPACE2,SHFT H]ELP
    [SPACE3]"'BDNP
160 ME$="LMXYNDSCQHEP":MM$="BC01MR"
    :POKE 53272,23'DQXL
170 DIM SD(63):VC=53248:COL=1:BC=0
    :M0=2:M1=5'GGFN
180 FOR I=1 TO 63:POKE 703+I,0
    :NEXT'GMWJ
190 POKE VC+32,9:POKE VC+33,BC
    :PRINT CHR$(129)'GUKM
200 POKE 2040,11:POKE VC+39,COL
    :POKE VC+21,1:POKE VC,70
    :POKE VC+1,140'IMAJ
210 PRINT CHR$(147)CL$:GOSUB 390'DMXB
220 REM *** MAIN PROG ***'BOGB
230 GOSUB 1900'BELA
240 FOR I=1 TO LEN(ME$)
    :IF X$=MID$(ME$,I,1)THEN 270'IWPJ
```

to Waterbury #2 next

# CATALOG

```
250 IF X$=CHR$(ASC(MID$(ME$,I,
    1))+128)THEN 270'HVQK
260 NEXT:GOTO 230'CERD
270 ON I GOSUB 300,480,760,790,820,
    1070,1210,1340,1370,1390,1540,
    1790'CFPO
280 GOTO 230'BDEF
290 REM *** LOAD SPRITE ***'BQEJ
300 PRINT"[CLEAR]"BL$"[HOME,RVS,
    SHFT F]ILE NAME";'BEOC
310 INPUT FL$'BDIY
320 FOR I=LEN(FL$)TO 1 STEP-1
    :IF MID$(FL$,I,1)=" "THEN
    FL$=LEFT$(FL$,I-1):NEXT'OFVO
330 OPEN 15,8,15:OPEN 1,8,4,FL$+",S,
    R"'DRKG
340 INPUT#15,A$,B$,C$,D$
    :IF VAL(A$)=0 THEN 380'FXBI
350 PRINT"[HOME]"BL$"[HOME,RVS]"B$"
    : ";:GOSUB 1920'CLSG
360 GOSUB 1900'BELE
370 GOTO 390'BDLF
380 FOR I=1 TO 63:INPUT#1,SD(I)
    :POKE 703+I,SD(I):NEXT'HYYO
390 POKE VC+21,1:PRINT"[HOME,DOWN2]
    "TAB(23)"[RVS,SHFT D]ATA"'EKFM
400 FOR I=1 TO 63 STEP 3'EFYB
410 PRINT TAB(20);'CECB
420 FOR J=0 TO 1'DDEC
430 PRINT SD(I+J)",";:NEXT'DIAE
440 PRINT SD(I+2)'CGPE
450 NEXT'BAED
460 PRINT"[HOME]"CL$:CLOSE 15:CLOSE 1
    :RETURN'EJNI
470 REM *** MULTI-COLOR ***'BRSJ
480 PRINT"[CLEAR]"BL$"[HOME,RVS,
    SHFT M]ULTICOLOR: [SHFT B,SPACE3,
    SHFT C,SPACE3]0[SPACE3]1[SPACE3,
    SHFT M,SPACE3,SHFT R]"'BDSR
490 PRINT"[HOME,DOWN2]"TAB(15)"
    [SHFT B] = [SHFT B]
    ACKGROUND COLOR"'CDDP
500 PRINT"[DOWN]"TAB(15)"[SHFT C] =
    [SHFT S]PRITE COLOR"'CDFG
510 PRINT"[DOWN]"TAB(15)"0 = [SHFT M]
    ULTICOLOR #0"'CDWG
520 PRINT"[DOWN]"TAB(15)"1 = [SHFT M]
    ULTICOLOR #1"'CDYH
530 PRINT"[DOWN]"TAB(15)"[SHFT M] =
    [SHFT M]ULTICOLOR ON/OFF"'CDLK
540 PRINT"[DOWN]"TAB(15)"[SHFT R] =
    [SHFT R]ETURN TO MAIN MENU"'CDYL
550 GOSUB 1900'BELF
560 FOR I=1 TO LEN(MM$)'EHJJ
570 IF X$=MID$(MM$,I,1)THEN 600'EOKL
580 IF X$=CHR$(ASC(MID$(MM$,I,
    1))+128)THEN 600'HVVQ
590 NEXT:GOTO 550'CEWJ
600 ON I GOSUB 640,1340,670,700,
    730'CVUF
610 IF I=6 THEN PRINT"[CLEAR]"BL$
    :GOSUB 390:RETURN'GKIH
620 GOTO 550'BDJD
630 REM * BACKGROUND COLOR *'BRPI
640 BC=BC+1:IF BC=16 THEN BC=0'GNIL
650 POKE VC+33,BC:RETURN'DIJI
660 REM * MULTICOLOR #0 *'BONK
670 M0=M0+1:IF M0=16 THEN M0=0'GNGN
680 POKE VC+37,M0:RETURN'DIFL
690 REM * MULTICOLOR #1 *'BOON
700 M1=M1+1:IF M1=16 THEN M1=0'GNKH
710 POKE VC+38,M1:RETURN'DIHF
720 REM * MULTICOLOR ON/OFF *'BSWI
730 IF PEEK(VC+28)=0 THEN POKE VC+28,1
    :RETURN'IOKM
740 POKE VC+28,0:RETURN'DHDI
750 REM *** X-EXPAND ***'BOHJ
760 IF PEEK(VC+29)=0 THEN POKE VC+29,1
    :RETURN'IOMP
770 POKE VC+29,0:RETURN'DHEL
780 REM *** Y-EXPAND ***'BOIM
790 IF PEEK(VC+23)=0 THEN POKE VC+23,1
    :RETURN'IOAS
800 POKE VC+23,0:RETURN'DHXF
810 REM *** ENTER DATA ***'BPJH
820 PRINT"[HOME]"BL$"[HOME,RVS,SHFT E]
    NTER DIGITS ONLY, ENDING WITH
    RETURN"'BDRQ
830 PRINT"[HOME,DOWN3]";'BBAG
840 FOR I=1 TO 21:PRINT TAB(20)"
    [SPACE16]":NEXT'GJMN
850 PRINT"[HOME,DOWN2]"TAB(23)"[RVS,
    SHFT D]ATA":PRINT TAB(21);'EIKM
860 FOR I=1 TO 63 STEP 3'EFYL
870 FOR J=0 TO 2'DDFL
880 SD$=""'BDIL
890 PRINT"[CMDR @,LEFT]";'BBXN
900 GOSUB 1900:LS=LEN(SD$)'DMBH
910 IF X$="*"THEN PRINT LEFT$(CU$,
    LS)MID$(BL$,2,LS+1)LEFT$(CU$,
    LS+1);:GOTO 880'KKXS
920 IF LS=3 THEN GOTO 950'EGUI
930 IF X$>="0"AND X$<="9"THEN
    SD$=SD$+X$:PRINT X$;'KQCQ
940 IF X$=CHR$(13)AND LS=0 THEN
    PRINT"0";'HKRO
950 IF X$=CHR$(13)GOTO 970'EJSM
960 GOTO 890'BDQK
970 SD=VAL(SD$):IF SD<=255 THEN
    1000'GRWR
980 LS=LEN(SD$):PRINT LEFT$(CU$,
    LS)MID$(BL$,2,LS+1)LEFT$(CU$,
    LS+1);'IMAA
990 GOTO 880'BDPN
1000 IF J<2 THEN PRINT" , ";
     :GOTO 1020'FIOX
1010 PRINT" ";'BBST
1020 SD(I+J)=SD:POKE 703+I+J,SD'FRFC
1030 NEXT J:PRINT:PRINT TAB(21);'EHTY
1040 NEXT I'BBCW
1050 PRINT"[CLEAR]"CL$:GOSUB 390
     :RETURN'DILC
1060 REM *** DISKIF ***'BMSC
1070 PRINT"[CLEAR]"BL$:PRINT TAB(5);
     :POKE VC+21,0'FORG
1080 OPEN 1,8,0,"$0"'BGSD
1090 GET#1,A$,A$'BIXE
1100 GET#1,A$,A$'BIXV
1110 IF A$=""THEN 1170'DGSX
1120 GET#1,A$,B$'BIYX
1130 PRINT ASC(A$+CHR$(0))+ASC
```

```
    (B$+CHR$(0))*256;'JSNG
1140 GET#1,A$'BFIY
1150 IF A$=""THEN PRINT:PRINT TAB(5);
    :GOTO 1100'HLRF
1160 PRINT A$;:GOTO 1140'CISC
1170 CLOSE 1:PRINT"[HOME]"BL$"[HOME]";
    :GOSUB 1920'DLXF
1180 GOSUB 1900'BELD
1190 PRINT"[CLEAR]"CL$:POKE VC+21,1
    :GOSUB 390:RETURN'FPWJ
1200 REM *** SAVE SPRITE ***'BQTY
1210 PRINT"[HOME]"BL$"[HOME,RVS,
    SHFT F]ILE NAME";'BEQA
1220 INPUT FL$'BDIX
1230 FOR I=LEN(FL$)TO 1 STEP-1
    :IF MID$(FL$,I,1)=" "THEN
    FL$=LEFT$(FL$,I-1):NEXT'OFVN
1240 OPEN 15,8,15:OPEN 1,8,4,FL$+",S,
    W"'DRPF
1250 INPUT#15,A$,B$,C$,D$
    :IF VAL(A$)=0 THEN 1290'FYAH
1260 PRINT"[HOME]"BL$"[HOME,RVS]"B$"
    : ";:GOSUB 1920'CLSF
1270 GOSUB 1900'BELD
1280 GOTO 1320'BEDE
1290 FOR I=1 TO 63'DEKG
1300 PRINT#1,SD(I)'BHMX
1310 NEXT'BAEW
1320 PRINT"[HOME]"CL$:CLOSE 15:CLOSE 1
    ::RETURN'EKVC
1330 REM **** COLOR ****'BNSC
1340 COL=COL+1:IF COL=16 THEN
    COL=0'GRHI
1350 POKE VC+39,COL:RETURN'DJYF
1360 REM **** QUIT ****'BMIF
1370 PRINT"[CLEAR]";:POKE VC+21,0
    :POKE 53272,21:END'FSMK
1380 REM **** HELP ****'BMIH
1390 PRINT"[CLEAR]"BL$"[HOME,RVS,
    SHFT H]ELP: ";:GOSUB 1920
    :POKE VC+21,0'EQWN
1400 PRINT"[DOWN,RVS,SHFT L,RVOFF] =
    [SHFT L]OAD SPRITE FROM
    DISK"'BAAF
1410 PRINT"[DOWN,RVS,SHFT M,RVOFF] =
    [SHFT M]ULTI-COLOR MODE"'BAPF
1420 PRINT"[DOWN,RVS,SHFT X,RVOFF] =
    [SHFT E]XPAND IN X-DIRECTION"'BA
    UH
1430 PRINT"[DOWN,RVS,SHFT Y,RVOFF] =
    [SHFT E]XPAND IN Y-DIRECTION"'BA
    WI
1440 PRINT"[DOWN,RVS,SHFT N,RVOFF] =
    [SHFT E]NTER NEW SPRITE
    DATA"'BAFJ
1450 PRINT"[DOWN,RVS,SHFT D,RVOFF] =
    [SHFT D]ISK MENU"'BADH
1460 PRINT"[DOWN,RVS,SHFT S,RVOFF] =
    [SHFT S]AVE SPRITE TO DISK"'BAAL
1470 PRINT"[DOWN,RVS,SHFT C,RVOFF] =
    [SHFT C]HANGE SPRITE COLOR"'BASM
1480 PRINT"[DOWN,RVS,SHFT E,RVOFF] =
    [SHFT E]DIT SPRITE DATA"'BATM
1490 PRINT"[DOWN,RVS,SHFT P,RVOFF] =
    [SHFT P]RINT SPRITE"'BAWM
1500 PRINT"[DOWN,RVS,SHFT Q,RVOFF] =
    [SHFT Q]UIT PROGRAM"'BAOE
1510 GOSUB 1900'BELA
1520 PRINT"[CLEAR]"CL$:POKE VC+21,1
    :GOSUB 390:RETURN'FPWG
1530 REM**** EDIT ****'BMFE
1540 PRINT"[HOME]"BL$"[HOME,RVS]
    SPACE TO CONTINUE,
     RETURN TO SELECT"'BDKN
1550 PRINT"[HOME,DOWN3]"TAB(20);'CEVF
1560 FOR I=1 TO 63 STEP 3'EFYH
1570 FOR J=0 TO 2'DDFH
1580 PRINT"[RVS]"SD(I+J)LEFT$(CU$,
    LEN(STR$(SD(I+J)))+1);'HYCQ
1590 GOSUB 1900:IF X$=" "THEN PRINT"
    [RVOFF]"SD(I+J)"[RIGHT]";
    :GOTO 1750'HTXQ
1600 IF X$<>CHR$(13)THEN 1590'FKRE
1610 PRINT"[HOME]"BL$"[HOME,RVS,
    SHFT E]NTER NEW DATA: ";'BECG
1620 SD$=""'BDIC
1630 PRINT"[CMDR @,LEFT]";'BBXE
1640 GOSUB 1900:LS=LEN(SD$)'DMBH
1650 IF X$="*"THEN PRINT LEFT$(CU$,
    LS)MID$(BL$,2,LS+1)LEFT$(CU$,
    LS+1);'JGYR
1655 IF X$="*"GOTO 1620'DGDM
1660 IF LS=3 THEN GOTO 1680'EHOJ
1670 IF X$>="0"AND X$<="9"THEN
    SD$=SD$+X$:PRINT X$;'KQCQ
1680 IF X$=CHR$(13)AND LS=0 THEN
    PRINT"0":GOTO 1710'IOWP
1690 IF X$=CHR$(13)THEN 1710'EKOM
1700 GOTO 1630'BEHB
1710 SD=VAL(SD$)'CHAE
1720 IF SD>255 THEN PRINT"[LEFT4,RVS,
    SPACE5,LEFT4]";:GOTO 1620'FLYN
1730 SD(I+J)=SD:POKE 703+I+J,SD'FRFK
1740 PRINT"[CLEAR]"CL$:GOSUB 390
    :RETURN'DILI
1750 NEXT J:PRINT:PRINT TAB(20);'EHSI
1760 NEXT I'BBCG
1770 PRINT"[HOME]"CL$:RETURN'CENJ
1780 REM **** PRINT ****'BNHL
1790 PRINT"[HOME]"BL$"[HOME,RVS,
    SHFT P]RINTING...":OPEN 4,4'CHLP
1800 PRINT#4,FL$:PRINT#4'CHED
1810 FOR I=1 TO 61 STEP 3'EFWF
1820 FOR J=0 TO 2:BI=128:BI$=""
    :SD=SD(I+J)'HWPM
1830 IF SD<BI THEN BI$=BI$+" ":BI=BI/2
    :GOTO 1850'IVHO
1840 BI$=BI$+"[SHFT Q]":SD=SD-BI
    :BI=BI/2'GTNO
1850 IF BI>=1 THEN 1830'EHDK
1860 PRINT#4,BI$;:NEXT:PRINT#4,
    SD(I)SD(I+1)SD(I+2)'FCAQ
1870 NEXT'BAEI
1880 CLOSE 4:PRINT"[HOME]"CL$
    :RETURN'DGCM
1890 REM **** GET S/R ****'BOVN
1900 GET X$:IF X$=""THEN 1900'EJDG
1910 RETURN'BAQD
1920 PRINT"[RVS,SHFT P]
    RESS SPACE TO CONTINUE"
    :RETURN'CBDM
```

BY MARK JORDAN

# A Computerized Birthday Card for the Commodore 64

How do you say happy birthday to your sweetheart? Buy a card? Write a note? Just plain say it?

Have you ever considered using your Commodore 64? With the VIC and SID chips at your disposal, you can create a card that will do more than just spell out the greeting: it will sing and dance your thoughtful message into your sweetie's heart.

Sound too hard? It isn't, because the hardest part is already done—just type in the listing and the card is done, complete with animated sprites, three-part harmony and a punchy ending. Then, by simply typing in two tiny changes, you can personalize this musical message to suit your special occasion.

Of course, you could design and program your own card idea for a completely personal greeting. If you have the skills, do it. But if you are a little uncertain about coordinating sprites with music, or if you just lack the confidence to design it yourself, by all means use this program as a starter. Don't let the length of the listing scare you. It *is* long (actually, I condensed this version to make it magazine-acceptable). But the "Magazine Entry Program" in this magazine will help you enter the code correctly.

I think you'll find it worth the effort. And, by examining the program explanation below, you can enhance your use of sprites and music. With this listing as a prototype, you can modify and personalize the program to become dozens of different greeting cards. The ultimate hope is that, after seeing and hearing how effectively your 64 will send birthday or holiday greetings, you will write your own.

## How to Type it In

In typing "Birthday Boy" (or "Birthday Girl") in you will note that data lines 430-745 are very neatly arranged in three-digit units. Feel free to leave off any leading zeros in any three-digit number. For example, if the number is 031, simply type in 31.

You'll also notice an alternate set of data for the sprites. If you are a male, type in the data in the main listing. (This will yield a male sprite, "Mr. Dark Glasses.") If you are a female, use the alternate set of data (and get Mr. Glasses' female counterpart, "Blondie"). By inserting your own sprite data you can make this a birthday card to anyone, male or female, friend or foe.

Once you've got it typed in, please resist the temptation to run it immediately. Save it first, just in case you made some typing error that will crash it. Then personalize it. You can do this by changing the name Sherry in line 315 to the name of your favored one, and the name Mark in line 330 to your own name.

## How to Run It

Like every good piece of software, this one needs a little instruction in how to run it. Here's the scenario. In private, get it typed in and debugged. You'll note in your initial run that before the program will begin, you must "Press any key." Lines 50 and 55 cause this little delay. Its purpose is so that, when you're finally ready to present it to your special friend, you can, in private, get the program running up to this point and then invite the card's recipient into the room. Direct him/her to the computer and then step back and watch.

Let me warn you, this program cannot be used hundreds of times and it won't help make your life more efficient. But I believe you'll find it a worthwhile addition to your collection of programs. It's fun, it's novel, and it just might help draw that hesitating friend or sweetheart into a more intimate relationship with not only you, but also your Commodore 64. Better yet, you may find that your Commodore 64 has a range of uses you hadn't considered up to now.

## Program Explanation

| Lines | |
|---|---|
| 10 - 20 | Set variables and screen |
| 25 | Read in screen pokes |
| 30 - 40 | Read in three voices' high frequencies, low frequencies, and durations into arrays |
| 45 | Read in sprite data |
| 50 - 55 | Allow user to continue program |
| 60 - 110 | Set sprite variables and values |
| 115 - 120 | Program control loop |
| 125 - 135 | Subroutine for setting up "inside" screen of card |
| 140 - 205 | Subroutine for "outside" design of card |
| 210 - 290 | Subroutine to play music and move sprites (see further breakdown below) |
| 295 - 300 | Subroutine to "open" card |

| | |
|---|---|
| 305 | Subroutine to change sprites |
| 310 - 335 | Subroutine to print "inside" message |
| 340 - 360 | Subroutine to print decorative border |
| 365 | Screen pokes |
| 370 - 420 | Music data |
| 425 - 745 | Sprite data |

### Breakdown of Music Loop

| | |
|---|---|
| 210 | Clear SID chip |
| 215 | Turn on volume, set attack/decay |
| 220 | Set sustain/release |
| 225 | Set duration indexes |
| 230 - 240 | Check if note duration countdown is over and if so, turn off voice |
| 245 | Change the pointer of two sprite music notes to make them dance |
| 250 | Loop to release note |
| 255 - 265 | Poke in low and high frequencies |
| 270 | Poke wavelengths and turn on voices |
| 275 | Check if note 25 in voice 1 then print final message |
| 280 | Check if note 20 in voice 1 then change sprites |
| 285 | Check if note 19 in voice 1 then open card |
| 290 | Hold note, then loop back C |

```
10 BO=53280:BA=53281:SC=1024:CC=55296
   :X=156:X1=4:V=53248:S=54272
   :MU=-1'KHAQ
15 DIM VH(25),VL(25),VD(25),UH(21),
   UL(21),UD(21),WH(21),WL(21),
   WD(21)'BMLP
20 POKE BO,4:POKE BA,1:PRINT"[CLEAR]";
   'DLSC
25 FOR T=1 TO 8:READ A(T):NEXT'FJVH
30 FOR T=1 TO 25:READ VH(T),VL(T),
   VD(T):NEXT'FXVH
35 FOR T=1 TO 19:READ UH(T),UL(T),
   UD(T):NEXT'FXVM
40 FOR T=1 TO 21:READ WH(T),WL(T),
   WD(T):NEXT'FXUI
45 FOR T=12288 TO 12798:READ A
   :POKE T,A:NEXT'GSNM
50 PRINT"[CLEAR,DOWN,SPACE8]
   TOUCH ANY KEY, SWEETIE"'BAMJ
55 GET A$:IF A$=""THEN 55'EHRJ
60 POKE V+21,195'CHVE
65 FOR T=0 TO 7:POKE 2040+T,192+T
   :NEXT'HPSO
70 FOR T=0 TO 10 STEP 2:POKE V+T,172
   :NEXT'HNLK
75 POKE V+12,75:POKE V+14,255
   :POKE V+8,161'GVRQ
80 POKE V+1,191:POKE V+3,210
   :POKE V+5,210:POKE V+7,191
   :POKE V+9,171'KJFR
85 POKE V+11,191:POKE V+13,100
   :POKE V+15,190'GXYR
90 POKE V+28,63:POKE V+37,0
```

*Continued on pg.60*


## An integrated business software package for the C-64™ for $1.59 a Program? Yes.

The Intelligent Software Package for **C-64™**, **VIC™**, **SX-64™**, **Plus 4™**, **16™**, **'B'-Series™**, and **PET/CBM™**. No games, no fancy packaging, and you can't buy it anywhere but here. But: 22 powerful, useful programs that will put your Commodore to work right now, in your home or office; all on one disk at the ridiculous price of **$35.** Includes:

**Database:** A complete multi-keyed fixed-record-length data base manager. Sort or select [using all relational operators: , = >, <, AND, OR, NOT, wild card] on any field, perform computations on numeric fields. Any operation can be performed on all, or only selected records. All fields completely user-definable. Can be used for any number of tasks, including accounting, mailing lists, inventory control, record, tape, or book cataloging, expense account manintenance, or as an electronic rolodex. Even if you use your Commodore for nothing else, this program alone might justify its expense.

**Word Processor:** The orginal word processor for the VIC-20, W/P is now available for all CBM models. A full-featured menu-driven word processor including very fast file commands [including a disk catalog], screen editing, text locating and full control over margins, spacing, paging, indentation, and justification. "*. . . well done and highly functional . . . Provides an excellent alternative to the high priced word processors . . . this is an excellent buy. Highly recommended.*" — Midnite Software Gazette. "*Provides good basic features.*" — Compute's Gazette.

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Also Included: **ReportGen, ReportMerge** [interface W/P with Database to create form letters, statements, invoices, mailing labels, other reports.]; **Baseball Statistician** [compiles batting statistics for a baseball league]; several W/P utilities, including **Index** [indexes W/P's text files]; several Database utilities, including **DBmerge** [facilitates multi-file database applications.], AND **DBStat** [analyzes D/B files]; a programming utility, **ASCII,** which converts text files [program listings] into program files; also **Checkbook**; **Inventory**; **Paper Route**; **Loan Analysis**; **Breakeven Analysis**; **Depreciation**; **Labeler**; more.

Versions of the package are available for any and every Commodore computer having a minimum of 10k RAM [does it say 'Commodore' on it? How about on the box it came in?] Add $3 if you have an 8050 disk drive. All programs will fully support tape, disk, and printer. The package is available only on disk; however, you may order any two programs on cassette for $20. Price includes documentation and shipping within USA and Canada; all other countries, add $5 [no personal checks from outside USA]. No charge cards. For C.O.D., enclose $5 fee; Calif. residents add 6%. This ad is the catalog.

**Intelligent Software**
Quality Software since 1982

Box A Dept. P
San Anselmo, CA 94960

# BIRTHDAY CARD

```
   :POKE V+38,7'GSDM
95 FOR T=39 TO 44:POKE V+T,2:NEXT'GLLQ
100 POKE V+45,15:POKE V+46,15
    :POKE V+29,16'GUUD
105 POKE V+39,2:POKE VV+40,2
    :POKE V+41,2:POKE V+42,2
    :POKE V+43,14:POKE V+44,2'MMKP
110 POKE V+45,12:POKE V+46,12'ENNB
115 GOSUB 340:GOSUB 140:GOSUB 210'DLRE
120 GOTO 120'BDCX
125 POKE BO,6:POKE BA,3
    :PRINT"[CLEAR]"'DKNG
130 X=154:X1=14:GOSUB 340'DNTC
135 RETURN'BAQD
140 PRINT"[HOME,DOWN2]";'BBJA
145 PRINT,"[L. BLUE,LEFT2,CMDR +,
    SPACE4,CMDR +,SPACE3]",,;'BEUK
150 PRINT,,"[LEFT] [CMDR +,SPACE2,
    CMDR +,SPACE4,CMDR +,SPACE4,
    CMDR +,SPACE3,CMDR +]"'BCDJ
155 PRINT,"[LEFT,SPACE2,CMDR +,SPACE4,
    CMDR +,SPACE3,CMDR +,SPACE3,
    CMDR +,SPACE3,CMDR +,RIGHT9]";
    'BCNP
160 PRINT,"[LEFT,SPACE3,CMDR +,SPACE5,
    CMDR +,SPACE3,CMDR +,SPACE3,
    CMDR +,SPACE3,CMDR +]"'BBLJ
165 PRINT,"[LEFT,SPACE3,CMDR +,SPACE5,
    CMDR +,SPACE3,CMDR +,SPACE3,
    CMDR +,SPACE3,CMDR +,RIGHT9]";
    'BCYP
170 PRINT,"[LEFT,SPACE3,CMDR +,SPACE6,
    CMDR +,SPACE5,CMDR +3]"'BBXK
175 PRINT,"[DOWN,PURPLE,SPACE3]
    DESERVE THE BEST"'BBLN
180 PRINT,,"[DOWN,YELLOW,RVS] [CMDR I]
     "'BCYF
185 PRINT,,"[LEFT,RVS,SHFT POUND,
    RVOFF,SHFT POUND,RVS,SHFT POUND,
    RVOFF,SHFT POUND]",,;'BFUO
190 PRINT,,"[LEFT2,RVS,SHFT POUND,
    RVOFF,SHFT POUND,RVS,SHFT POUND,
    RVOFF,SHFT POUND]"'BCFK
195 PRINT,,"[LEFT2,RVS] [CMDR U]
     "'BCFM
200 PRINT,,"[PURPLE,LEFT4]CAN[SPACE2]
    GIVE"'BCXC
205 RETURN'BAQB
210 FOR T=S TO S+24:POKE T,0:NEXT'GKED
215 POKE S+24,15:POKE S+5,66
    :POKE S+12,66:POKE S+19,66'IBQM
220 POKE S+6,130:POKE S+13,130
    :POKE S+20,130'GWHG
225 Q=1:Y=1:Z=1'DIHH
230 VD(Q)=VD(Q)-1:IF VD(Q)=0 THEN
    POKE S+4,16:Q=Q+1'JCIL
235 UD(Y)=UD(Y)-1:IF UD(Y)=0 THEN
    POKE S+11,16:Y=Y+1'JDQQ
240 WD(Z)=WD(Z)-1:IF WD(Z)=0 THEN
    POKE S+18,16:Z=Z+1'JDJM
245 MU=-MU:POKE 2046,PEEK(2046)+MU
    :POKE 2047,PEEK(2047)-MU'IHOR
250 FOR T=1 TO 30:NEXT'EFWE
255 POKE S,VL(Q):POKE S+1,VH(Q)'DQVL
260 POKE S+7,UL(Y):POKE S+8,UH(Y)'ERLI
265 POKE S+14,WL(Z):POKE S+15,
    WH(Z)'ETDO
270 POKE S+4,17:POKE S+11,17
    :POKE S+18,17'GTJK
275 IF Q=25 THEN 310'DGWL
280 IF Q=20 THEN GOSUB 305'EGMH
285 IF Q=19 THEN GOSUB 295'EGDM
290 FOR T=1 TO 100:NEXT:GOTO 230'FKBK
295 K=K+1:IF K<4 THEN RETURN'GGDP
300 GOSUB 125:RETURN'CELX
305 POKE V+21,220:RETURN'DIEF
310 PRINT"[HOME,DOWN5,GRAY1]",
    "YOU'RE MY PERFECT TEN"'BBKF
315 PRINT,"[BLUE,DOWN,SPACE7]SHERRY"
    :REM  YOUR SWEETHEART'S NAME
    HERE'CBNO
320 POKE V+21,252'CHPB
325 FOR T=150 TO 0 STEP-1
    :POKE S+24,T/10:POKE V+11,T
    :FOR I=1 TO 10:NEXT:NEXT'PCDT
330 PRINT,,"[RED,DOWN,SPACE5]LOVE,",,,
    "[SPACE5]MARK":  REM   YOUR NAME
    HERE'CSKK
335 RETURN'BAQF
340 PRINT CHR$(X)"[RVS,SPACE2,SHFT S,
    SPACE4,SHFT S,SPACE4,SHFT S,
    SPACE4,SHFT S,SPACE4,SHFT S,
    SPACE4,SHFT S,SPACE4,SHFT S,
    SPACE4,SHFT S,SPACE2,RVOFF]";'CELO
345 FOR T=1 TO 23:PRINT"[RVS,SPACE2,
    SHFT S,SPACE2]",,,"[RIGHT,SPACE2,
    SHFT S,SPACE2]";:NEXT'FKOO
350 PRINT"[RVS,SPACE2,SHFT S,SPACE4,
    SHFT S,SPACE4,SHFT S,SPACE4,
    SHFT S,SPACE4,SHFT S,SPACE4,
    SHFT S,SPACE4,SHFT S,SPACE4,
    SHFT S] [HOME]"'BALN
355 FOR T=1 TO 8 STEP 2
    :POKE SC+A(T),A(T+1)
    :POKE CC+A(T),0:NEXT'KCGT
360 POKE SC+999,160:POKE CC+999,X1
    :RETURN'FTJK
365 DATA 45,105,74,95,925,223,954,
    233'BDAO
370 REM       MUSIC  DATA'BJQH
375 DATA 50,60,2,50,60,1,56,99,2,50,
    60,2,67,15,2,63,75,4,50,60,1,50,
    60,1'BNEV
380 DATA 56,99,2,50,60,2,75,69,2,67,
    15,4,50,60,1,50,60,1,100'BBRP
385 DATA 121,2,84,125,2,67,15,2,63,75,
    2,56,99,4,89,131,1,89,131'BEPU
390 DATA 1,84,125,2,67,15,2,75,69,2,
    67,15,6'BJVN
395 DATA 0,0,2,0,0,1,42,62,4,50,60,6,
    42,62,1,37,162,1,25,30,4,37,162,1,
    63,75,1'BTOY
400 DATA 50,60,6,84,125,2,67,15,2,50,
    60,2,44,193,4,44,193,4'BAAI
405 DATA 67,15,2,50,60,2,63,75,2,50,
    60,6,0,0,2,0,0,1,8,97'BXFM
410 DATA 4,6,167,2,6,71,4,4,180,2,6,
    71,4,4,180,2,4,48,2,8,97,2'BDQJ
415 DATA 6,71,2,8,97,4,10,143,2,11,48,
    2,5,152,4,5,71,1,4,180,1,4,48,
```

# BIRTHDAY CARD

```
    4'BKNP
420 DATA 6,71,2,8,97,2,4,48,4'BUVE
425 REM      SPRITES  DATA'BLKI
430 DATA 002,170,168,010,170,170,042,
    191'BGNH
435 DATA 234,170,191,250,170,255,254,
    170'BGDM
440 DATA 255,254,175,255,254,165,085,
    085'BGBI
445 DATA 173,085,085,173,087,085,237,
    087'BGHN
450 DATA 213,253,087,245,255,243,252,
    255'BGNJ
455 DATA 243,255,255,207,255,063,085,
    084'BGRO
460 DATA 063,085,084,015,255,255,015,
    250'BGGK
465 DATA 175,003,255,255,000,255,252,
    002'BGRP
470 DATA 010,255,160,042,190,168,170,
    170'BGVL
475 DATA 170,170,170,170,170,170,170,
    168'BGAQ
480 DATA 170,138,168,170,138,170,170,
    170'BGIM
485 DATA 242,170,175,242,170,175,242,
    170'BGDR
490 DATA 175,241,000,031,241,085,095,
    255'BGYN
495 DATA 085,127,063,000,060,001,085,
    080'BGOS
500 DATA 001,085,080,001,093,080,001,
    093'BGKF
505 DATA 080,001,093,080,002,170,170,
    040'BGFK
510 DATA 170,255,170,170,190,170,170,
    170'BGYG
515 DATA 170,170,170,170,042,170,168,
    010'BGQL
520 DATA 170,160,002,170,160,002,170,
    160'BGDH
525 DATA 002,170,160,002,170,160,002,
    170'BGXM
530 DATA 160,001,000,016,001,085,080,
    001'BGRI
535 DATA 085,080,001,085,080,001,085,
    080'BGTN
540 DATA 001,085,080,001,081,080,001,
    081'BGEJ
545 DATA 080,001,081,080,002,170,042,
    040'BGAO
550 DATA 254,170,191,254,170,191,254,
    255'BGMK
555 DATA 191,254,255,191,254,255,191,
    254'BGTP
560 DATA 255,191,252,255,063,253,085,
    127'BGPL
565 DATA 253,085,127,253,093,127,253,
    093'BGQQ
570 DATA 127,253,127,127,252,255,063,
    252'BGIM
575 DATA 255,063,252,255,063,253,085,
    127'BGNR
580 DATA 253,085,127,252,255,063,252,
    234'BGKN
585 DATA 063,252,255,063,255,000,255,
    002'BGTS
590 DATA 085,085,085,085,085,085,106,
    170'BGWO
595 DATA 169,104,160,009,096,160,009,
    096'BGMT
600 DATA 162,137,104,162,137,104,162,
    137'BGYG
605 DATA 104,162,137,104,162,137,104,
    162'BGSL
610 DATA 137,104,162,137,104,162,137,
    104'BGUH
615 DATA 162,137,104,162,137,104,162,
    137'BGYM
620 DATA 096,032,009,096,032,009,106,
    170'BGCI
625 DATA 169,085,215,085,087,215,213,
    000'BGIN
630 DATA 010,128,000,136,136,128,136,
    136'BGRJ
635 DATA 138,136,136,136,138,136,138,
    128'BGQO
640 DATA 002,008,128,002,010,170,000,
    000'BGLK
645 DATA 170,000,000,000,000,000,010,
    002'BGPP
650 DATA 128,042,138,160,170,170,040,
    170'BGSL
655 DATA 170,040,170,168,168,170,162,
    168'BGLQ
660 DATA 042,170,160,010,170,128,002,
    170'BGFM
665 DATA 000,000,168,000,000,032,000,
    000'BGYR
670 DATA 000,000,000,000,000,000,000,
    000'BGEN
675 DATA 000,000,003,224,000,063,224,
    003'BGKS
680 DATA 255,224,003,255,224,003,252,
    032'BGOO
685 DATA 003,192,032,002,000,032,002,
    000'BGIT
690 DATA 032,002,000,032,002,007,160,
    002'BGJP
695 DATA 015,224,122,015,224,254,015,
    192'BGQU
700 DATA 254,007,128,252,000,000,120,
    000'BGUH
705 DATA 000,000,000,000,000,000,000,
    000'BGEM
710 DATA 000,000,000,000,000,000,000,
    000'BGEI
715 DATA 000,000,000,000,000,062,000,
    000'BGMN
720 DATA 063,240,000,063,255,000,063,
    255'BGLJ
725 DATA 000,035,255,000,032,062,000,
    064'BGWO
730 DATA 002,000,064,002,000,064,002,
    015'BGLK
735 DATA 064,004,031,192,004,031,192,
    244'BGOP
740 DATA 031,129,252,015,001,252,000,
    001'BGVL
745 DATA 248,000,000,240,000,000,000,
    000'BGYQ
```

*Continued on pg. 62*

# GIRL SPRITE

```
425 REM GIRL SPRITE  DATA'BOXJ
430 DATA 000,252,240,003,255,252,015,
    255'BGLH
435 DATA 252,015,247,252,063,253,255,
    063'BGGM
440 DATA 247,255,255,253,255,255,255,
    255'BGYI
445 DATA 255,243,255,245,085,087,255,
    084'BGAN
450 DATA 087,255,084,087,255,020,023,
    255'BGOJ
455 DATA 020,023,255,000,003,255,002,
    131'BGUO
460 DATA 255,010,163,255,194,131,255,
    192'BGHK
465 DATA 015,255,213,127,255,192,063,
    060'BGCP
470 DATA 254,255,239,250,191,235,250,
    191'BGML
475 DATA 234,250,175,234,250,171,234,
    012'BGUQ
480 DATA 171,163,012,170,163,012,042,
    163'BGNM
485 DATA 012,042,131,015,010,003,003,
    250'BGNR
490 DATA 015,085,085,085,000,170,160,
    000'BGON
495 DATA 170,160,002,170,168,002,170,
    168'BGTS
500 DATA 000,016,064,000,016,064,000,
    016'BGUF
505 DATA 064,000,016,064,000,168,168,
    002'BGNK
510 DATA 160,063,010,170,063,042,042,
    063'BGJG
515 DATA 042,010,191,168,010,191,160,
    002'BGIL
520 DATA 174,160,000,170,128,000,170,
    128'BGLH
525 DATA 000,042,000,000,042,000,000,
    042'BGWM
530 DATA 000,000,170,128,002,170,160,
    002'BGRI
535 DATA 170,160,010,170,168,010,170,
    168'BGRN
540 DATA 000,016,064,000,016,064,000,
    016'BGUJ
545 DATA 064,000,016,064,000,168,168,
    002'BGNO
550 DATA 240,051,015,243,255,207,243,
    255'BGXK
555 DATA 207,243,223,207,243,247,207,
    243'BGDP
560 DATA 223,207,243,247,207,243,255,
    207'BGGL
565 DATA 243,207,207,253,085,095,253,
    081'BGMQ
570 DATA 095,253,081,095,252,080,095,
    252'BGQM
575 DATA 080,095,252,000,015,252,010,
    015'BGHR
580 DATA 252,042,143,255,010,015,171,
    000'BGFN
585 DATA 042,171,085,106,171,255,234,
    060'BGAS
590 DATA 085,085,085,085,085,085,106,
    170'BGWO
595 DATA 169,104,160,009,096,160,009,
    096'BGMT
600 DATA 162,137,104,162,137,104,162,
    137'BGYG
605 DATA 104,162,137,104,162,137,104,
    162'BGSL
610 DATA 137,104,162,137,104,162,137,
    104'BGUH
615 DATA 162,137,104,162,137,104,162,
    137'BGYM
620 DATA 096,032,009,096,032,009,106,
    170'BGCI
625 DATA 169,085,215,085,087,215,213,
    000'BGIN
630 DATA 000,000,000,000,000,000,000,
    000'BGEJ
635 DATA 042,000,128,032,138,138,160,
    136'BGRO
640 DATA 136,042,168,136,002,160,138,
    130'BGUK
645 DATA 160,128,170,168,128,128,136,
    010'BGDP
650 DATA 128,138,000,000,000,032,032,
    000'BGML
655 DATA 168,168,010,170,170,042,170,
    170'BGXQ
660 DATA 170,170,168,042,168,010,010,
    170'BGQM
665 DATA 010,002,170,168,000,170,160,
    006'BGBR
670 DATA 000,000,000,000,000,000,000,
    000'BGEN
675 DATA 000,000,003,224,000,063,224,
    003'BGKS
680 DATA 255,224,003,255,224,003,252,
    032'BGOO
685 DATA 003,192,032,002,000,032,002,
    000'BGIT
690 DATA 032,002,000,032,002,007,160,
    002'BGJP
695 DATA 015,224,122,015,224,254,015,
    192'BGQU
700 DATA 254,007,128,252,000,000,120,
    000'BGUH
705 DATA 000,000,000,000,000,000,000,
    000'BGEM
710 DATA 000,000,000,000,000,000,000,
    000'BGEI
715 DATA 000,000,000,000,000,062,000,
    000'BGMN
720 DATA 063,240,000,063,255,000,063,
    255'BGLJ
725 DATA 000,035,255,000,032,062,000,
    064'BGWO
730 DATA 002,000,064,002,000,064,002,
    015'BGLK
735 DATA 064,004,031,192,004,031,192,
    244'BGOP
740 DATA 031,129,252,015,001,252,000,
    001'BGVL
745 DATA 248,000,000,240,000,000,000,
    000'BGYQ
```

BY HOWARD MILLMAN

# The Conversing Commodore 64: Breaking the Silence Barrier

*Using your Commodore 64 and modem, you can access telecommunications networks all over the country to acquire a wide variety of information. Now Comvoice, a new text-to-speech product, lets these networks talk to you—literally.*

Reading text from a telecommunications network is a peaceful pastime—relaxing, quieting. But boring. Now maybe that's okay—after all, we all need some quiet time once in a while. However, Genesis Computer Corporation has now breached the silence barrier by bundling a practical text-to-speech module with dedicated communications software. By itself, that's not earthshattering; the technology has been around for some time. Rather costly, but around. Genesis' system, Comvoice, is unusual first because of its low price and, more importantly, because of its purpose—telecommunications. Using a customized version of Microtechnic Solutions' *Smart 64* terminal software, all videotext users (subscribers to The Source, CompuServe or any of the 2,500+ other telecommunications bulletin boards) now have a read or listen choice. In other words, your computer can *speak* what's coming in from these networks. At buy-a-bargain prices, too.

## Gunga Din in a Can

Frequently, keeping a product's price reasonable results in performance compromises. To a degree that's acceptable, as it is here. So although Comvoice's pronunciation is somewhat reminiscent of a mechanical Gunga Din, it's still easily understandable. In fact, I even think it's appealing. True, its uncultured voice isn't comparable to that of Hal, the computer in "2001," nor the Woper in "War Games," but it doesn't cost a million bucks either. At $165.00, it's far superior to silence.

The cost includes a dedicated menu-driven version of the *Smart 64* terminal program. Besides providing the helpful, intelligent assistance a normal telecommunications program should, *Smart 64* also unlocks Comvoice's voice—but only when you tell it to. The voice can be toggled on or off by a simple dual keystroke. A thoughtful inclusion.

However, since having the computer speak each word slows the transmission rate, thereby increasing both telephone and connect costs, you may prefer to download all data into a disk buffer while you're online, then upload later to review or edit while offline. Again, simple keyboard commands suffice for either operation.

One note of caution: the *Smart 64* version bundled with Comvoice is dedicated—you can't use it without the speech module. (That's why it isn't copy protected). Microtechnic Solutions' regular stand-alone terminal software, number four, will not work with the Comvoice module. However, if you have any of the earlier versions (versions two, three or the newly released four) and wish to use it with the Comvoice speech module, Microtechnic Solutions will upgrade it for a nominal $5.00 fee.

The Comvoice module was originally designed to translate text into speech from user-written BASIC programs; it still retains that feature. Plug the unit into the cartridge port, turn on your Commodore 64 and type the command SPEAK " ". Inside the quotes type whatever you want vocalized. This sounds—and is—simple. However, Comvoice's real strength remains in its ability to vocalize videotext data transmitted via telephone lines from the many telecommunications networks operating around the world.

Genesis' adaption of their basic product to this use was sparked partially as a result of inquiries from visually-handicapped groups who wanted access to telecommunications. The many doors that are now closed to visually-handicapped computer users are reason enough to welcome this product. But the potential uses go far beyond even this significant need.

For instance, both educational and entertainment software for children or other pre-readers will no longer be limited to icons and one-syllable words. A program's content can be expanded far beyond earlier simplistic limitations while adult supervision is lessened or even unnecessary. And show-and-tell assumes a sweeping new dimension when the computer can vocalize information from immense national databases.

The potential for expanding the usability of the already popular videotext services is enormous; just as the talkies revolutionized the silent movie screen, so then will speech revolutionize the silent screen. Integrating even a robotic voice adds a welcome dimension to your purpose, a warmth to the chill.

For example, in The Source's text adventure game "Castlequest", I'm now verbally warned I'll shortly be devoured, decapitated or resurrected. It's so much nicer to first hear of your impending demise than to merely read your obit.

During a session with another of The Source's services, I cleaned up a six-month muddle of cables, papers and paraphernalia while listening to Comvoice describe automobiles for sale. Any service offered on these networks can be heard instead of just

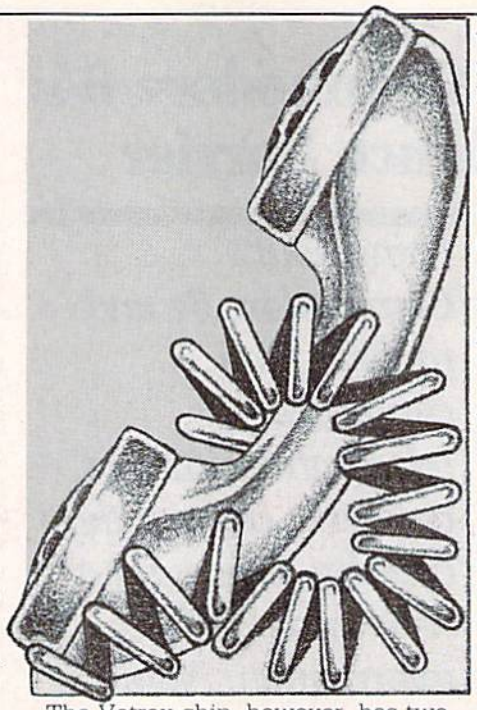
*Continued on pg. 64*

read: travel, movie reviews, employment, current events, new and used merchandise, plus dozens more.

A service especially well suited to this approach is The Source's "Chat" ("CB Simulator" on CompuServe). This real-time interactive dialogue service provides children or adults, the ability to "small talk" with someone almost anytime. Now, instead of having to read your conversation on the screen, you can actually *hear* it. And by no means is this minor miracle confined to just The Source or CompuServe. Pilot programs presently underway include links to banks and supermarkets. Audit your account or order your groceries and your computer can vocalize the whole transaction. The cost is the hourly access fee plus telephone charges, usually via Tymnet, Uninet or even a Watts line.

## From Primal Grunts To The King's English

The mechanics of the system are straightforward. Genesis uses the Votrax SCO1A speech chip, a phoneme-based convertor (also used in Heathkit's robots, Hero and Hero Jr). All spoken language can be simplified into phonemes or elemental constituents. When phonemes are properly combined, every word in the English language can be said.



The Votrax chip, however, has two significant shortcomings. First, it is unable to provide accurate inflection. Humans automatically raise the pitch of their voice at the end of a sentence, for instance, when asking a question. Right? Votrax doesn't. Second, the chip doesn't always know what syllable to accent. Although some 450 algorithms—rules of diction—are programmed into ROM, not every instance can be included. So some combinations of words are mispronounced. Still recognizable, they are nevertheless odd sounding, reminiscent of a literate foreigner learning English.

When writing your own programs, it's easy to overcome this shortcoming. Simply spell words as they are pronounced: phonetically. Comvoice, for instance, insisted on saying my name as howARD. After I misspelled it as How Ward, the pronunciation was fine. By cleverly combining imagination with humor, you can recreate pronunciations varying from primal grunts to the King's English.

An alternative to phoneme-based chips is the technique of linear predictive coding (LPC). LPC uses a stored digitized voice pattern, usually female. Interestingly enough, the female voice records and plays back clearer than the male. On an eight-bit machine like the Commodore 64, the vocabulary is limited to about 250 words or approximately 8K of memory. The voice quality, diction and pronunciation is excellent since, after all, it's a recreated human voice speaking. Commodore, for example, utilizes LPC in its *Magic Voice* speech cartridge. So do car manufacturers, with voices that say "Fasten your seat belt, please" and other friendly phrases aimed at keeping you safe.

So the LPC technology has a refined, yet limited, vocabulary while the Votrax chip is comparatively inarticulate, yet provides an unlimited number of words. Given these two options, Comvoice's faults in fluency related to its Votrax technology are a troubling, yet tolerable, flaw.

Right now the chip is trained to recognize and speak only alphanumeric combinations. That means when it is translating a telecommunications network, there are abbreviations, punctuation and occasionally special symbols (arrows) that are not correctly verbalized, if at all. Even so, it's possible, even probable, the meaning will be clear. If not, you can always read it for verification.

Next year will see new computers introduced with sophisticated on-board text-to-speech convertors, a natural extension to built-in modems. In fact, last summer's Consumer

**Suppliers Telecommunications Speech Products and Network Services**

*Comvoice:*
Genesis Computer Corp.
P.O. Box 152
Hellertown, PA 18055
215-861-0850

| | |
|---|---|
| Comvoice cartridge: | $ 99.95 |
| w/dedicated software: | $149.90 |
| Speaker/amplifier: | $ 40.00 |
| Monitor sound cable: | $ 14.95 |

*Smart 64 Terminal*
Microtechnic Solutions, Inc.
P.O. Box 2940
New Haven, CT 06515
203-389-8383

| | |
|---|---|
| Terminal Version #4: | $49.95 |
| Comvoice Version: | $49.95 |
| Comvoice Update: | $ 5.00 |

*The Source*
1616 Anderson Road
McLean, VA 22102
800-336-3366
Call for subscription rates and connect charges

*Directory of Online Databases:*
Cuadra Associates, Inc.
2001 Wilshire Blvd.
Santa Monica, CA 90403
213-829-9972

| | |
|---|---|
| single issue: | $40.00 |
| annual (4) issues: | $75.00 |

*CompuServe*
P.O. Box 20212
5000 Arlington Centre Blvd.
Columbus, Ohio 43220
800-848-8199
Call for subscription rates and connect charges. C

Electronics Show in Chicago saw the beginnings of formal industry recognition of the expanding market for text-to-speech convertors. And less than two months later, even IBM acknowledged the trend by announcing the availability of a speech module for the PC*jr*.

Next-generation computers will likely incorporate speech in on-board ROM or as an option. This in turn will create additional impetus to provide software, service and support to further develop the untapped potential of this promising market.

Even as I write this, Genesis is preparing beta test versions of an interactive educational and entertainment software series. If the collaborative effort with Aardvark Software succeeds, the first speech-integrated adventure games will be available by Christmas.

Additionally, there are hundreds of private bulletin boards and thousands of specialized online services that you can now have talk to you. In fact, if you're really interested, you might subscribe to Cuadra Associates' "Directory of Online Databases". It lists more than 2,500 services by location, description, size and subject. From prosaic to esoteric, they're all here.

*"Fifth generation" computers will converse in natural language and by 1990 keyboards will be used only by quaint antiquarians.*

## The First Step

Oscar Wilde once said that the only way to get rid of temptation is to yield to it. I'm tempted, I'm mortal, I'm yielding. But please remember, being a visionary isn't easy.

My prediction: The computer industry will sense this singular, potentially explosive market and rise to meet the challenge. Demand for and sophistication in text-to-speech conversion will increase, price decrease.

Japan has already funneled mountains of money and redirected national goals to speed development of their "fifth generation" computers. Their avowed intention centers on developing computers that can reason, make decisions and evaluate variables—in other words, that have artificial intelligence. And one more imperative virtue: these machines will converse in natural language. By 1990 keyboards will be used only by quaint antiquarians and shipwrecked computerists.

Along this road, every intersection arrow points to the same destination: speech-integrated computers—the first step in the journey, the mile-long journey to artificial intelligence. C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Circle Reader Service No. 13

# Who Will Design The Perfect Game?

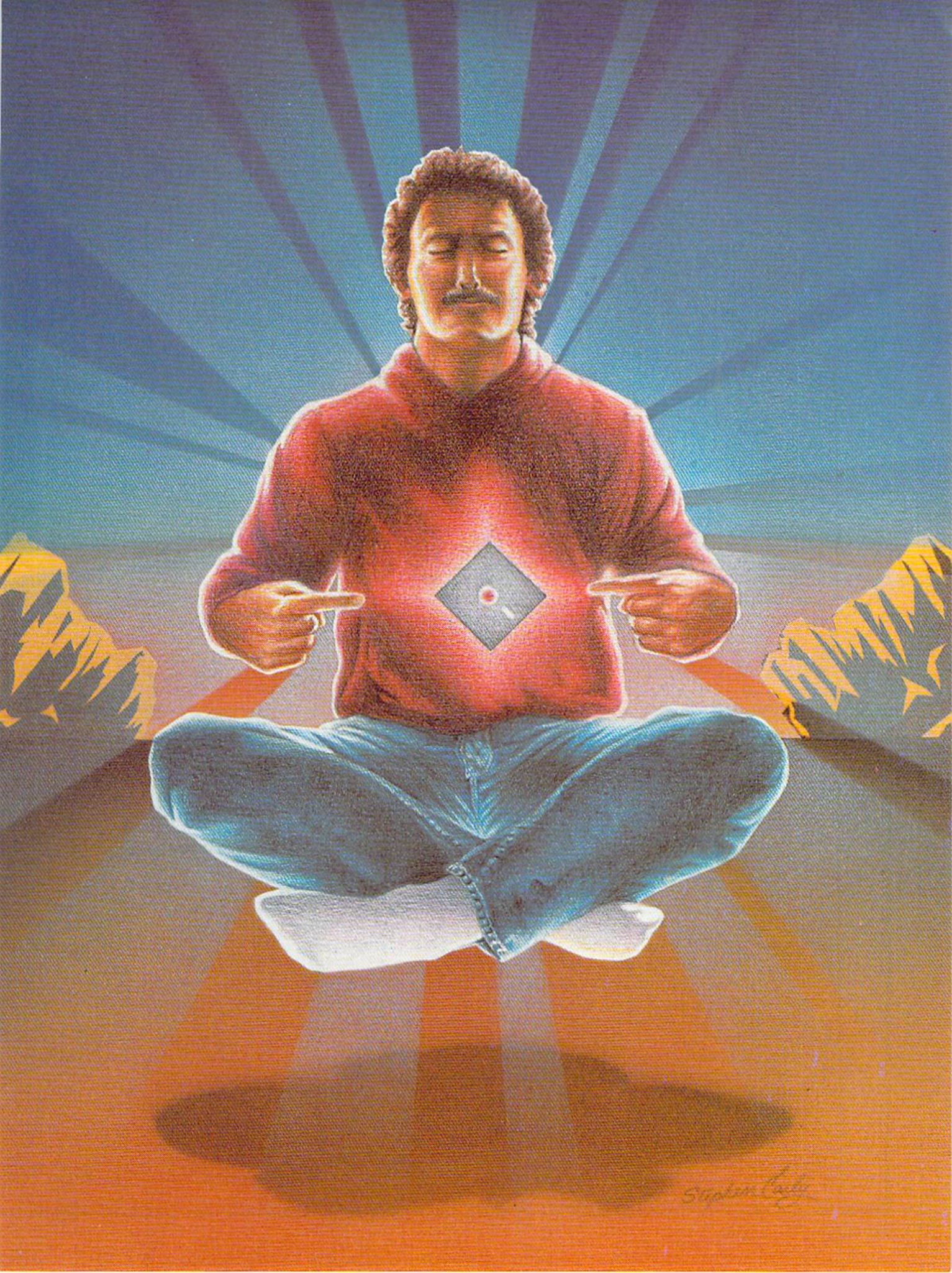
by Kellyn Beeck
Software Acquisitions Manager
Epyx, Inc.

Someday, someone will design the Perfect Computer Game. I'm thinking about a Game with a capital G, a game that will transcend mere entertainment. This Game will be a work of art; indeed, it will be a masterpiece.

Some people think there's no point in holding your breath, though, because the art of computer game design is still in its infancy. As a matter of fact, you'd have a hard time getting those people to agree that computer games will ever evolve from the *Pacman* era to become a form of art. "Art," they'll say, "has nothing in common with computer games. Absolutely nothing."

Whether this is true or not, if someone finally designs the Perfect Game (maybe in our lifetime?) it will not be by accident. The designer of that Game will apply certain fundamental principles which, in one form or another, are being applied right now to the most successful games on the market. And even though these principles are bound to be modified as computer games continue to change and evolve, it might be helpful for potential game designers to know what we at a software company look for in the games that are submitted to us.

STEPHEN EARLY



## BE ORIGINAL

*"Here are this week's submissions, Ron".*

*The software evaluator looked up from his computer, where he was creating a document that looked something like the* Communist Manifesto. *He was, in fact, writing the manual for his company's next game,* Fun with Revolution.

*"If there's one trivia game in there," he shot back at the visitor standing in the doorway of the office, "I'm throwing out the whole bunch. We've gotten seven this month already."*

You submitted the world's greatest computer game to your favorite publisher, and this is the reception it gets! Why, you spent months programming and testing it, working out the bugs and sweating over every last detail. When it was ready, you lovingly slipped the disk into a Whizbang Indestructo Bulletproof Floppy Diskette Mailer and licked the strip of horrible-tasting glue, sealing the flap carefully. Then you cast your eyes heavenward, muttering, "Please let them like it," and thrust the square brown envelope into the mailbox. You had no idea that such callous cretins lay in wait at your program's destination.

Alas, it's true. I'll be the first to admit that I'm a callous cretin. I can't help it. Software companies review scores of game submissions to find just one game worthy of publishing, and after you have spent months looking at bad programs, you begin to greet each new arrival with a jaundiced eye. Still, every submission is given a chance and even the most cynical software evaluator is seen beaming proudly when he discovers a good game. And if it's a very, very good game, he may even giggle uncontrollably. So how do you design a game that will cause uncontrollable giggling?

Just keep a couple of things in mind. The first is originality.

## PICK A POPULAR COMPUTER

*Recognizing the crooked grin that Ron saved for moments like this, the programming assistant turned a speculative eye to the stack of floppy disks she held in her hands. With a frown, she ventured, "Yup, looks like there's a trivia game here, all right. In fact, I think they're all trivia games...this one's titled* Baboon Trivia, *there's also a* Trivial Dispute, Trivia is Cute, Trivia Computer, Trivia for the Astute,...*and here's one called* Trivia is a Three-Piece Suit."

*"O.K.," Ron replied, feigning seriousness, "if there's one for the Commodore 64, we'll buy it."*

Strangely enough, that is often the first question asked when a software publisher receives a submission, and it is one of the keys to making your game marketable. You may have thought that a game could be programmed on a Pocket Fuzzpro 2000 and no one would care, provided it was a really terrific game. After all, most companies seem to convert every game they sell to run on a dozen different machines, don't they?

Unfortunately, that is not exactly the truth. The typical independent software manufacturer first releases a game on the one or two hottest computers. Then, if the game takes off and becomes a big seller, the company starts converting it to run on the other micros. Converting your terrific game for the Pocket Fuzzpro 2000 will probably seem too risky.

Program your masterpiece for one of the most popular computers on the market. Now, when the publisher receives your submission, it will go into the pile of programs that will be looked at first.

## WRITE IN ASSEMBLY LANGUAGE

*"Really?" The assistant tried to look surprised. "You mean we'll buy this game without even looking at it?"*

*Ron was laughing. "If you really have a submission named,* Trivia is a Three-Piece Suit, *and it's written in*

# The Formal Proposal

*BY GEORGE SHELDON*

Grabbing a publisher's eye is not easy, but it's also not impossible, either. Your most important sales tool is The Formal Proposal.

After you have written a query letter to a publisher, and have received a positive response (yes, we would be interested in knowing more about your program, etc.) it is time to prepare an indepth, Formal Proposal.

Send your formal proposal along with a cover letter that gently reminds the publisher that you have received the okay from him or her to submit the proposal. Make certain that your cover letter states the program you have written is prepared and ready for submission.

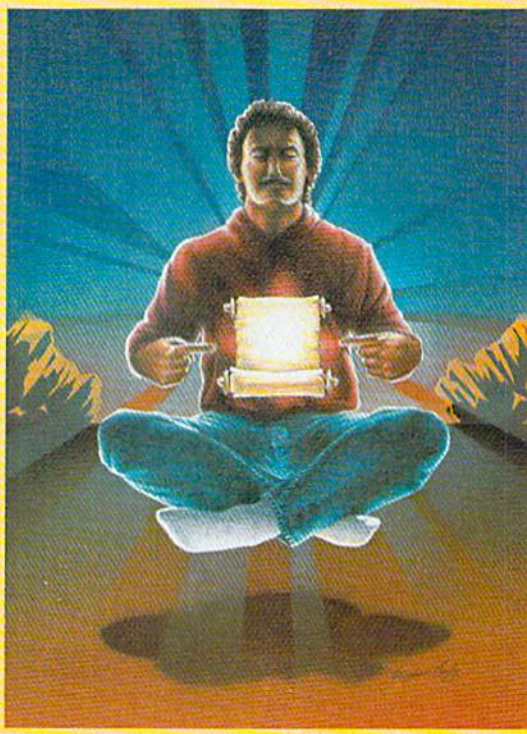
The formal proposal, when submitted, should be a document of two to eight pages in length, single spaced and neatly typed on a good quality, white, bond paper. The complexity of your program will determine the proposal's final length.

Your formal proposal should have an appearance of one of those old history outlines you had to prepare in the tenth grade, using Roman numerals for your captions, etc.

The formal proposal should include:

1. PROGRAM IDENTIFICATION—list your full name, address, and phone number, as well as the working title of your program.

2. THE PROGRAM OVERVIEW—a summary of the program you have written, with a brief description of its unique or unusual features.



*assembly language for the Commodore 64, go and get me a contract. We'll buy it."*

*"Gee, I'm sorry. I guess I forgot to mention it, but these games are all in BASIC," replied the assistant. "I suppose you won't want to look at them, right?"*

This is the next step in your effort to get the software publisher's attention. When the evaluator picks up a game, he's a lot more likely to give it a good, hard look if it's written in assembly language.

There are a lot of reasons for this, but the most important is execution speed. Programs written in BASIC and other interpreted languages run slower than machine language programs written with an assembler. Machine language uses instructions which the computer can execute directly, while other languages must be interpreted or compiled before the computer will understand what you want it to do.

You could write your game in a high-level language like PASCAL and compile it, but an assembler will produce a faster, shorter program that is almost a requirement for a microcomputer game. Micros are smaller and slower than their mainframe counterparts, so they need the extra speed associated with assembly language. And, of course, speed is a necessity if you want to produce appealing graphics. Animation, scrolling and full-color screens are all best achieved with an assembled machine language program, so if you want a publisher to look at your game, use assembly language. Programs written in BASIC are not likely to be taken seriously.

## INCLUDE THE RIGHT FORMS

*"Put them over there."* Ron gestured toward an amorphous heap of disks and letters in the corner of the room. *"I'll get to them next week."*

*"Sure," said the assistant, turning to look at the pile on the floor. "You know as well as I do that most of that stuff has been sitting there for months. You're —"*

*"O.K., O.K. You're right. Tell you what. If you'll give me a hand, we can sort out the ones that didn't come with disclosure agreements. Those have to be sent back. Then we can go through the rest."*

You wrote your game in assembly language for the most popular home computer, but the publisher sent it back! You not only wasted a perfectly good Super Indestructo Bulletproof Floppy Diskette Mailer and $1.53 postage, but you also wasted two valuable weeks. Now, you have to fill out some stupid forms and mail the disk all over again. It wouldn't be so bad, except for one thing. You'll have to lick that horrible-tasting glue on the envelope again.

Every software publisher has a procedure for handling submissions, and your best bet is to write the company a letter asking how to submit your game. They'll send you the information promptly, but if you're really in a hurry, give them a phone call. They'll probably be happy to take your name over the phone and send you the necessary forms.

Getting those callous cretins in the software industry to at least notice

*Continued on Pg. 120*

# More About Freelance Programming

*BY GEORGE SHELDON*

Finding more information about the subject of freelance programming may be as difficult as writing a quality software package.

There are two books available on the subject, which I would recommend the serious freelance software programmer to study.

**1985 Programmers Market,** lists a series of software publishers that are actively seeking freelance submissions. The listings include the name of the person to contact within the software publisher's organization, and also includes the types of programs sought, computer types required, and examples of current software being published. The book also includes several chapters on how to market your software programs.

**Writing Software User Manuals** was written for writers to make money preparing user manuals, but it is a book that any serious freelance programmer will want to review in detail. I am impressed by the way the book takes the reader through the preparation of a fictional user manual. There is a lot of good tips about making the manual easily understandable.

Both books are available from Writer's Digest Books, 9933 Alliance Road, Cincinnati, Ohio, 45242. If they are not available at your local book store, you can order the books by mail by calling 800-543-4644.

3. THE PROBABLE USER—who will the final user of your program be? School students, or real estate agents?

4. DESCRIPTION OF THE PROGRAM—in detail, describe your program. Spend the time to make sure the explanation of your program is crystal clear, so after reviewing this section of your report, your prospective publisher will know exactly what your program is, what it will do, and how it works. Don't forget to describe all of the programs outstanding features.

5. TECHNICAL REQUIREMENTS—Describe both the hardware and the software requirements of your program. Include the make and model of the computer your program will operate, the memory size of the program and required memory of the computer. Other technical information included in this section is the number of disks required, any other hardware or software that might be required, and the language in which your program is written.

6. DOCUMENTATION—Describe what documentation is available for use with your program.

7. PROBABLE MARKET—describe the probable market for your software program, and list any known competition or similar programs. Detail why your program is superior to any other on the market, if any.

8. CONCLUSION—Reach a conclusion that it makes sense to publish your program for any number of reasons: nothing else like it is available anywhere, superior to any other similar program, the market potential is tremendous, etc.

Remember, the formal proposal is your "sales representative" in the prospective software publisher's office. Spend some extra time to refine it to a document of persuasive perfection.

# The Making of a Game Programmer

BY JUDY BRADDICK Commodore Software

Have you ever wondered if you've got what it takes to become a bona fide professional game programmer? The creator of Commodore's *Solar Fox* gives you a behind-the-scenes look at how she won her wings.

It all started when I graduated from college. Here I was with this degree in computers. That was supposed to mean that I knew how to program. What do I do now?

At the same time I was looking for a job, Commodore was looking for three programmers to join their recreational software group. (That's the games group.) I interviewed for the position and, to my great surprise, was offered a job. This was great! Where else can you work a white collar job in blue jeans and sneakers? One of my biggest fears in life is that I will have to put on real shoes.

Now I was officially a "recreational software programmer." What does that mean? Where did I start?

## A Trainee's Work is Never Done

At Commodore I started at trainee level. This means that I wrote small routines for a senior programmer. My supervisor was Andy Finkel. In a case like this, we "black box." Black boxing is when the senior tells the junior what the routine should do, what information goes into that routine and what must come out of it. If you look at *DragonsDen* by Andy Finkel, you will see birds circling. My first real routine was the one that makes the birds fly up, circle around, then attack the player.

In the meantime, it was important for me to learn as much about games as possible. At Commodore, we have an arcade room full of Bally/Midway game machines. We convert the games for Commodore computers. It is very common to see a few programmers in the game room. We say we are doing "research." In reality, we are sometimes really working.

In my case, I had never really played arcade games until I started to work here, which was why I was so surprised to get the job. In order to write games, one must know how to play them. It would be very difficult to find a problem in level 16 if you can only play to level three. However, I began to pick up game-playing skills pretty quickly, once I focused on it. In fact, I quickly became a video maniac. People had trouble dragging me past arcades. I never said I was playing. I was always doing research or checking out the competition. I'm still not an expert, but I can wrap *Solar Fox* and *Satan's Hollow*.

## Career Planning (?)

One day I was in the arcade room at work playing *Solar Fox*, when John Mathias, the head of our group, asked me if I liked the game. I said yes. He then asked if I wanted to write it. I

*Continued on Pg. 118*

JOHN DEEDZY

L.C. ROGALSKI

# LEGAL ISSUES IN MARKETING SOFTWARE

*Before a software masterpiece goes to market a lawyer is going to ask these—and probably many other—questions. So if you're thinking about marketing that hot new game yourself, be prepared.*

**BY HERBERT SWARTZ**

According to the best estimates, some 15,000 computer programs are written each day in the United States. Their potential value? Tens of billions of dollars.

Whether you are the creator of one of these programs, or the person who, through license or sale, has control over the program, the goal is the same: to go to market and take advantage of those available billions.

First comes the trip to the lawyer. No one publishes a book or makes a will without seeing an attorney. So there you stand, floppy disk in hand, proclaiming for all the world to hear that your software masterpiece is destined to be used and loved by millions. And make you millions in the process.

All that is necessary is that the lawyer hurry to protect your legal rights and help you develop a distribution scheme for the software. That's when you find out that the road from creation to production and distribution may be longer and more complex than the original task of devising the software.

The lawyer will ask a lot of questions, want to see a number of documents, will further check a number of your representations. Don't take things personally; don't become frustrated. The lawyer is simply doing his job—and that begins with a thorough investigation.

Does the software actually work? The attorney will ask for a demonstration and, most likely, he will have an expert on hand to evaluate the software. No one wants a lawsuit. But that is precisely what can result from software that doesn't work as it is supposed to.

Today, as every computer lawyer is well aware, bad software can bring on many legal risks. Among the possible grounds for a lawsuit: fraudulent advertising, breach of implied warranties and negligent design. Particularly with software for the microcomputer, the legal risks are many and severe. The user is a consumer, and law favoring consumers is flourishing.

Next, the attorney will turn his investigation to the potential claims of competitors. Is there a possible charge of misappropriation? Some developers have packages that mimic software marketed by others. Even if the program itself has not been duplicated, the duplication of command codes, monitor displays and printout formats can lead to claims of copyright infringement and unfair competition.

As he investigates potential claims of liability, the lawyer has to worry

*Continued on Pg. 119*

LESLIE ROGALSKI

# PROBE
# QUESTP

BY JOHN JERMAINE

*Founder and CEO of the multi-million dollar software company Adventure International, 31 year-old Scott Adams made his mark by creating the first computer adventure games. His early offerings for Commodore computers included* Adventureland, Pirate Cove *(written by his wife, Alexis) and* Strange Odyssey.

*One of Scott's latest projects, recently released for the Commodore 64, is a series called* Questprobe *— graphic adventures featuring characters from Marvel comics, which are coordinated with comic books. He's come a long way from when he was devising computerized flood control systems for the state of Florida.*

*Here, John Jermaine talks to Scott about how he created* Questprobe.

**John:** Scott, may I have some information about your life beyond computers?

**Scott:** I'm 31 years old, happily married to Alexis, and we have three lovely children. I grew up in the Miami area, and have always lived in Florida. Today my hobbies are virtually non-existent because running Adventure International is a 40-hour a day job, and I enjoy programming in what little spare time I have. In the past, I have worked with model rocketry and I've raised pets of every description.

Arcade games have always fascinated me. I enjoyed the original *Asteroids*, *Space Invaders*, and *Pacman* games, with *Dragon's Lair* and *Mach Three* being my current favorites.

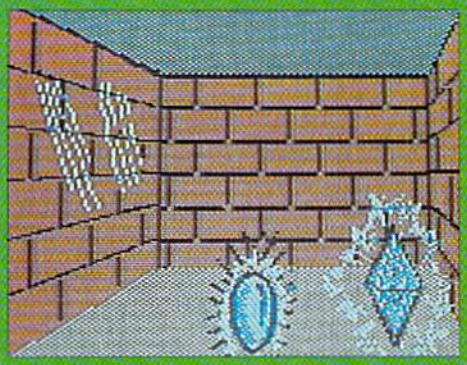
**John:** May I have some background material concerning the computer side of your life?

**Scott:** I'm a computer scientist. I was very fortunate back in high school because our school had a computer terminal, something very unusual before the dawn of the microcomputer age. I found out then and there that I loved computers.

Since I graduated high school, I've earned a bachelor of science degree in computer science at FIT, and I've done a lot of work for RCA on Antigua and Ascension Island.

**John:** What computer languages have you mastered?

**Scott:** My knowledge of computer languages ranges from machine languages for a dozen different processors and mainframes, to high level languages like Fortran, BASIC, Cobol, Forth, Algol, P41 and APL. Virtually



# NG ROBE:

**Young and incredibly successful, programmer-entrepreneur Scott Adams talks about the fun and frustration of creating a new series of games.**

every computer language out there I've used at one time or another.

**John:** Let's talk about your wife, Alexis. How has she influenced your business and your programming?

**Scott:** Alexis is the vice president of the corporation, and has been intimately involved in all aspects of the business from the very beginning. Her interests generally lean towards the management and business end of Adventure International. She has contributed to the writing of a number of my adventures, but she doesn't play them very much, or find them very interesting. She'd rather play an arcade game like *Pacman*.

**John:** Has Alexis contributed very much to the first *Questprobe* game?

**Scott:** My wife isn't very interested in Marvel characters, and she hasn't contributed very much to the Hulk graphic adventure game.

**John:** How long has Adventure International been producing Commodore 64 software?

**Scott:** AI has been involved in producing Commodore 64 software since the computer hit the market. We've been working pretty closely with Commodore on a number of machines.

**John:** How did you learn to program the Commodore 64?

**Scott:** I learned to program the Commodore 64 by sitting down, reading everything associated with it and basically playing with it. Learning to use the 64 was just learning to use another computer to me.

**John:** What was your comic background before you began the *Questprobe* project?

**Scott:** I have a very good background in Marvel comics because I have been reading them since the 1960's. When I was a kid, my favorite Marvel characters were Doctor Strange and The Thing, but I read most of the Marvel titles available. In recent months, I've been picking up some of the older comics and re-reading them. Currently I'm reading everything that Marvel issues on a daily basis.

**John:** How was the *Questprobe* project begun?

**Scott:** Marvel initiated the project back in 1983, by looking around for someone to license their characters to and put them in some form of home computer game. Adventure International was approached by Marvel and I thought that the project had a lot of

**I have a very good background in Marvel comics because I have been reading them since the 1960's. Currently I'm reading everything that Marvel issues on a daily basis.**

potential.

**John:** How did Adventure International finally get the license to develop the *Questprobe* games?

**Scott:** The negotiations for the Marvel contract lasted over six months, with the final version of that contract being signed on December 1, 1983. We began developing *Questprobe* almost immediately after the signing of that contract.

**John:** What was it like dealing with Marvel Comics, when you began the *Questprobe* project?

**Scott:** The Marvel characters were the first licensed characters that we've used or thought about using, so no one knew how well the project would develop. As I worked with Marvel, I found them to be one of the nicest groups of people, both as a company and as individuals, that it has ever been my privilege to work with. I've dealt with a number of other firms, and none of them can compare with Marvel's friendliness and easiness to work with.

**John:** How was the first *Questprobe* game's storyline developed?

**Scott:** To understand this answer, you have to know that I had virtually unlimited freedom in creating the *Questprobe* games, but Marvel has final approval of each game. I had a number of interesting ideas to use in the series, but we couldn't use them because Marvel was doing similar things to their characters in upcoming comics.

For instance, I came up with the basic idea for the Secret Wars before I had heard that Jim Shooter had done such a thing, and it was being released shortly thereafter. I came up with the idea of an insane Watcher, but again Marvel had plans to use that theme in the near future. With these setbacks I had to develop totally new ideas, which I approached Marvel with, and we worked out the *Questprobe* concept from there.

**John:** Where did the name *Questprobe* come from?

**Scott:** I came up with the name *Questprobe* one night by accident. I had lain awake a couple of nights, trying to come up with a title for the project that indicated that the player was involved in a search. Finally I jumped out of bed one night, and said, "Eureka, I'll call the project *Questprobe*."

**John:** Would you tell me about the Marvel people who helped to develop the *Questprobe* project?

**Scott:** Before I begin talking about the people at Marvel, you should know that the series of *Questprobe* games and stories are not all written, but are developed as we need them. I spent an afternoon with John Byrne coordinating an overview of the entire *Questprobe* series. This overview gives everyone working on *Questprobe* a rough idea of what will happen throughout the series.

John Byrne is quite articulate, incredibly talented, and very clever. Bob Budiansky is overseeing the entire *Questprobe* project. Joe Calamari, the vice president of Marvel, is the person who originally approached AI with the idea of licensing Marvel characters. Since the signing of the contract, Joe Calamari has been very involved with the business aspects of the project. Jim Shooter is Marvel's editor-in-chief, and his input into *Questprobe* has been very useful.

**John:** Have there been other contributors to the first *Questprobe* game?

**Scott:** Yes, a couple of Commodore 64 programmers and some in-house programmers and an artist at Adventure International did coding and conversion tests for the first game.

**John:** Why was the Hulk selected as the subject of the first game?

**Scott:** I used the Hulk to kick off the series because I had the freedom to do so. The Hulk is recognized by both comic and non-comic people alike. And his two forms—one weak and human, and the other super human—is an interesting subject for an adventure game.

**John:** Would you explain the dedication of the Hulk game?

**Scott:** I dedicated the game to Stan Lee, Alexis my wife and CIS CBers. I dedicated the game to Stan Lee because he was the man who really created Marvel comics, and is still active in them today. My dedication to my wife is obvious. CIS CBer stands for CompuServe Information Service CBers. I get a lot of enjoyment getting on CompuServe CB and just talking with people around the country.

**John:** What is really happening in the *Questprobe* comics and games?

**Scott:** The first *Questprobe* comic gives the player the background of the first *Questprobe* game. It doesn't explain the overview of what is taking place, or why the Hulk had to pass through the Chief Examiner's black doorway. *Questprobe* comic number two and beyond will begin to explain the many mysteries of *Questprobe*.

To play the games effectively, you need to know some of the inner workings of *Questprobe*. The games are testbeds in which you become your favorite Marvel characters. You supply the brains while the character supplies the power. Keep in mind that someone in the Marvel Universe is supposedly playing the same games, and for some unknown reason, he's doing something very similar to you.

**John:** How are the graphics produced in the Commodore 64 Hulk graphic adventure?

**Scott:** The pictures for the Hulk graphic adventure came directly from Marvel, in the form of pen and ink

**The Chief Examiner does resemble me. After I gave [Marvel] my photograph their artist responded that I was perfect—I looked so nicely evil.**

drawings. I do the programming myself, but we have some artists that do the work for entering the graphics. The Hulk graphics adventure contains between 50 and 70 pictures, varying in size from 100 to 4,000 bytes.

**John:** Scott, why does the Chief Examiner in the game resemble you?

**Scott:** The Chief Examiner does closely resemble me because that was one of the cute little touches that Marvel added to the series. They asked me to do it, and after I gave them my photograph, their artist responded that I was perfect—I looked so nicely evil.

**John:** In the Incredible Hulk comic book, the Hulk can leap great distances. Why wasn't this factor used in the Hulk *Questprobe* game?

**Scott:** The Hulk's leaping ability is not in the game because of limitations in adventure games. Secondly, you just can't put everything into one game, but you could consider the lack of his leaping due to the artificial gravity in the game's environment.

**John:** Why is the mirror in the Hulk game?

**Scott:** The mirror is very important because it actually lets you see if you are Bruce Banner or the Hulk at any given time in the game.

**John:** Would you give me some information about the gems and the bio gem in the *Questprobe* games?

**Scott:** The first game contains sixteen gems and one bio gem hidden within it. The gems provide work tasks for the player in the game. The bio gem is very important to the series, and that importance will be explained as the game series progresses. The second game, featuring Spiderman, will have a similar concept of searching for gems and one bio gem.

**John:** What is the fuzzy area in the Hulk game?

**Scott:** The fuzzy area represents a fuzzy area in space.

**John:** Why did you use the idea of a heavy gravity zone in the Hulk game?

**Scott:** I created the area of heavy gravity outside of the huge dome for a very special reason. I wanted to create an area of the game where you could only perform as the Hulk and being Bruce Banner wasn't good enough.

**John:** How do the *Questprobe* comics and games fit into the Marvel Universe, and what is coming up in the series?

**Scott:** As the *Questprobe* comics are read throughout the series, it will become more and more obvious what is going on. Also remember that things that you assume in the beginning of the series, may not necessarily be true in the end. The game series will be an interesting mixture of Marvel's greatest heroes encountering their old foes, with some new characters being introduced. Right now we're planning to use Spiderman as the subject of the second *Questprobe*, and he'll be busy battling Mysterio and Doctor Octopus.

In terms of the Marvel Universe, you are merely playing a computer game when you play the Hulk graphic adventure. Not only is it a game, but it's one that the Chief Examiner must play and win for reasons that will become apparent as the series progresses. In the end of the second *Questprobe* comic, the Chief Examiner will be seen seated at a computer terminal, playing the same *Questprobe* game that you're playing. This should reflect how important it is for you to solve the adventures.

**John:** How does the Hulk game end?

**Scott:** The game ends when you collect all sixteen gems and the very important bio gem. In the last screen of the game, the Chief Examiner appears and gives you a short message.

**John:** What was Marvel's response to the completed Hulk game?

**Scott:** I took the completed adventure version of the Hulk game to Marvel and showed it to Jim Shooter. I must admit that I was quite nervous, because I showed it to Jim for half an hour, and during that time he made no comment on the game. Finally he gave me a smile and said that it was excellent, and that he was very pleased. Amazingly, Marvel asked for no changes in the Hulk adventure game. There were some minor changes made in the graphics when they were put into the program.

**John:** Will the Chief Examiner be the main character in all of the *Questprobe* games and comics?

**Scott:** Absolutely! There are quite a few surprises coming concerning the Chief Examiner, which I don't wish to give away right now.

**John:** Are there sounds in any of the different computer versions of the first *Questprobe* game?

**Scott:** Currently there are no sounds in any of the Hulk *Questprobe* games, but that could change.

**John:** May I have some additional information about upcoming *Questprobe* games?

**Scott:** At this time, I am working on the second *Questprobe* game with Allen Milgrom, the writer of the second *Questprobe* comic.

We plan to release a game and comic every three to five months, with there being twelve or thirteen games to wrap up the series. The current order of characters to be featured in *Questprobe* games is The Incredible Hulk, The Amazing Spiderman, The Human Torch and Captain America. Iron Man could become the subject of one of the games, and we're considering using a villain as the

*Continued on Pg. 120*

# IT'S NOT HOW LITTLE IT COSTS, IT'S HOW MUCH YOU GET.

We have a surprise for all those people who think that in order to get more you have to pay more.

The Commodore 64.™

We also have a surprise for all those people who think they have to settle for less just because they're paying less.

The Commodore 64.

The Commodore 64 has a full 64K memory, high fidelity sound and high resolution, 16-color sprite graphics.

It's fully capable of running thousands of programs for schools, business or funny business.

But the Commodore 64 is about one third the price of the 64K IBM PCjr™ or the Apple IIe.™ In fact, for about the price of those computers alone you can get the Commodore 64, a disk drive, a printer and a modem—a powerful computing system.

We don't do it with mirrors, we do it with chips. We make our own. So we can make them for less, more efficiently and more economically than people who don't. (Which is just about everybody else.)

So because it's a 64, it's powerful. Because it's a Commodore, it's affordable. And because it's a Commodore 64, it's the world's best selling computer.

**COMMODORE 64**

IT'S NOT HOW LITTLE IT COSTS,
IT'S HOW MUCH YOU GET.

BY G. SCOTT WRIGHT

# At War with Your Computer

Maybe you've wished you had the time and patience — and room — to play one of the traditional board war games, but the sheer magnitude of the whole thing turned you off. The endless complicated rules, the painstaking calculations, the massive physical size of many of the traditional war games are enough to discourage even an avid aficionado of war strategies. Some of these games have over a thousand pieces to be moved each turn on maps that cover half a room. I've got one around here someplace with a map three feet high and ten feet wide.

Home *computer* war games, however, have changed all that. After all, what is a computer better at than keeping track of endless complicated rules, doing painstaking calculations and allowing a lot of action to take place in a very small area? In other words, when you play war on your computer, you let the computer take care of the dirty work so you can get down to the fun — working out brilliant strategies to outmaneuver and outfight your opponent.

These new computer war games — including a number of games for the Commodore 64 — have had to give up some of the historical detail traditionally included in the best board war games, but that's not necessarily bad. In fact, the result is ultimately positive — the games can be easily learned and are very exciting. The computer war games I have played have all called for clever tactics and brilliant moves and counter-moves. As a consequence, I've lost almost every game — but I've had a ball losing.

Whether you're playing against another player—and most of these games allow for either two players playing against each other or one player against the computer—you must assess the situation and work out the strategy that you think will achieve the game's objectives. This calls for an understanding of the capabilities of the various forces at your

**War Games for the Commodore 64**

| Game | Manufacturer |
|---|---|
| **Germany 1985:** The Second Edition<br>NATO forces must repel Soviet invasion of West Germany | Strategic Simulations |
| **Knights of the Desert**<br>Relive Germany's World War II desert campaign | Strategic Simulations |
| **Midway Campaign**<br>Naval engagements in the Pacific | Avalon Hill Microcomputer Games |
| **NATO Commander**<br>Defend Europe against Soviet invasion | MicroProse |
| | |
| **Nuke War**<br>Cold war in the late 20th century | Avalon Hill Microcomputer Games |
| **Operation Whirlwind**<br>Command a World War II battalion | Broderbund |
| **Panzer-JAGD**<br>Suicide mission on the Russian front | Avalon Hill Microcomputer Games |
| **Panzers East!**<br>The 1941 German drive on Moscow | Avalon Hill Microcomputer Games |
| **RDF 1985**<br>U.S. rapid deployment force | Strategic Simulations |
| **T.A.C.** (Tactical Armor Command)<br>Control tanks, anti-tank guns and infantry squads | Avalon Hill Microcomputer Games |
| **Tigers in the Snow**<br>Battle of the Bulge | Strategic Simulations |
| **Fighter Command**<br>Re-enact Germany's Luftwaffe raids on England. | Strategic Simulations |
| **Combat Leader** | Strategic Simulations |
| **Legionnaire** | Avalon Hill Microcomputer Games |

command and consideration of factors such as terrain, weather and how bright the person is you're playing against. (Computers aren't too bright, of course, but the people who have written the programs are, and that's what makes playing against the computer such a challenge.)

Developing these strategies is fascinating and, for many war gamers, the most fun of all, but there are also those who like to forget all that strategic nonsense, crank up their tanks and APC's and charge! They go like the blazes right at the enemy and figure it's worth the risk just to get in there and fight. The more cautious player, however, will develop an overall plan, outline the tactics that seem to stand the best chance of succeeding and begin.

And, believe me, watching your forces move into the patterns you have envisioned—watching them move down a road, reach a key intersection, split and form a pincer movement around the enemy, then go into battle with their greatest strength against the enemy's weakness—that's a rewarding sight. (I, of course, work out beautiful strategies, watch my forces move down a road, reach a key intersection, split and get both halves beaten to a pulp by the computer's forces, which have been hidden in the trees just waiting for some fool general to send his forces down those roads into the trap.)

War games tend to be longer than most computer games, and many of them make allowances for this by including a simple "save-the-game" feature. (I have been playing one game solitaire for two months—that's at the rate of about an hour and a half a night, one or two nights a week.) Solitaire—you against the computer—has the tremendous advantage of allowing you to take all the time you want to work out your next move, and no one gets restless or asks when you're going to make up your mind. The computer can wait as long as you can and never say a word. *Then* it beats you.

So computer war games are here for the Commodore 64, and they require studied thought, creative imagination, patience, aggressiveness and anything else you can think of to design strategies and tactics to win the battle.

*When it comes to learning the complicated rules of a war game maybe the best thing about your computer is that it can't laugh.*

But there is one thing they *don't* require—something which has discouraged so many players of traditional board war games. They *do not* require two weeks to read and learn the rules or a Ph.D. in math to figure out the combat results.

This is where the computer war games have it all over the board games. In the first place, the computer will limit your mistakes automatically. If you forget how far a tank battalion can move in one turn, the computer won't allow you to exceed the limitations. It won't allow you to move where your units can't go. It won't let you shoot farther than your unit's range. And so on.

But even more important is the fact that you are playing the game on the best system for learning information and skills ever developed—the computer itself. It has infinite patience, will go over and over some point until you master it and allow you to do dumb things without laughing at you.

That may sound unimportant, but it isn't. When it comes to learning complicated rules (or anything else, for that matter), maybe the best thing about your computer isn't its ability to manipulate numbers, or draw colorful pictures or play games. Maybe the best thing about your computer is that it can't laugh.

That's worth a lot.

And after awhile, you get the hang of it. You feel comfortable with the rules and understand the capabilities of your various forces. You start thinking like a soldier. Then you take on the enemy—even the computer—with a certain confidence, a certain sense of control, a certain anticipation of victory.

Of course, you'll probably get beaten once again, but not easily. No, sir. And *next* time! Just wait till next time! **C**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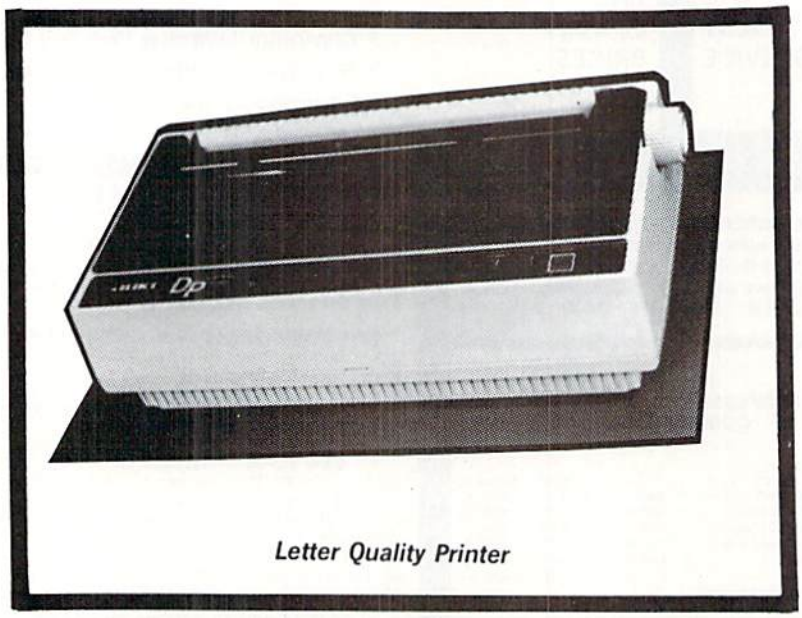

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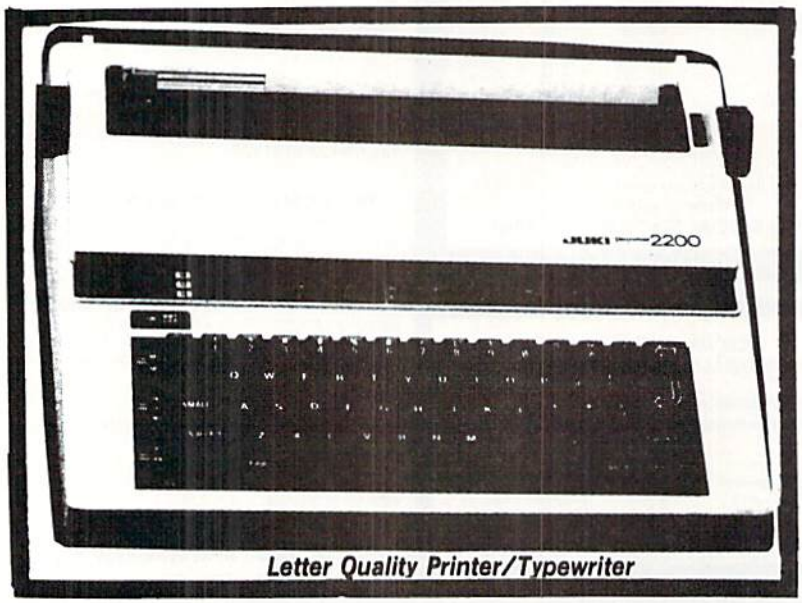

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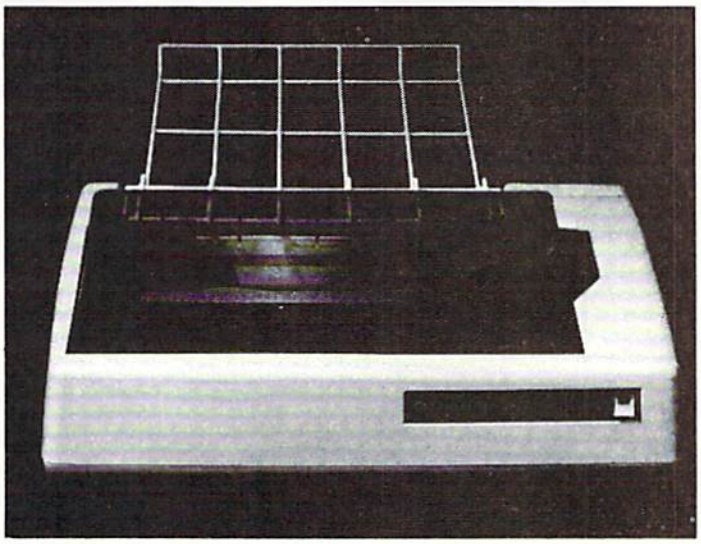

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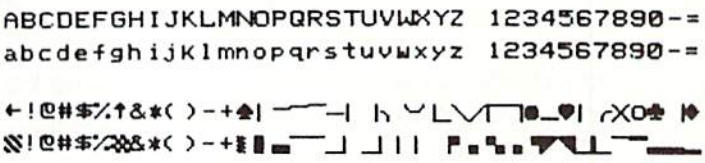


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## SPECIFICATIONS

**PRINTING METHOD**
Serial Impact Dot Matrix

**PRINT RATE**
100 characters per second (CPS)

**PRINT STYLE**
Correspondence Quality

**PRINT DIRECTION**
Bi-directional

**COLUMN CAPACITY**
80

**CHARACTER FONT**
8 X 8

**LINE SPACING**
Programmable

**CHARACTER SIZE**
0.094" high, 0.08" wide

**COPIES**
3, including original

**RIBBON TYPE**
Cartridge

**RIBBON LIFE**
1.2 million characters

**RIBBON CARTRIDGE**
Commodore P/N613160550

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BY GREG KUDASZ

# Alarm Clock for the 64

*Here is a multi-function program that turns your 64 into an alarm clock.*

### The Program

The register is the current time according to the computer. If the register reads 120000, then the time according to the computer is 12:00:00 or 12 o'clock on the nose. If the computer's time does not match real time (current time), you must reset the register when the message, IS THIS CORRECT SYSOP? appears on the screen. To do this, hit N. The screen will blank out and you will be signaled to input the correct time in 12-hour format. To enter a number in 12-hour format, enter a number between 010000 (1 o'clock) and 125959 (12:59:59 seconds). Do not enter time in 24-hour format (010000-240000). The computer uses AM/PM to tell the difference between after midnight and before noon, and after noon and before midnight. After you set the time, hit any key except the N key when you are asked if the register is the correct time.

### Functions

The time is displayed in the middle of the screen with a colon between the hour and the minutes. The seconds are displayed on top of the colon.

### Seconds

The seconds may be displayed in place of the time in the middle of the screen by pressing the "1" key. The screen will display the seconds for three seconds and will then return to telling the time. If you hit the "1" key and hold down the space bar, the seconds will remain on the screen. When you let go of the space bar, the time will return to the center of the screen.

### Setting AM/PM

This program keeps track of AM and PM the same way as most clocks and watches. To set the clock to AM or PM, hit the "2" key and then hit A for AM or P for PM.

### Displaying AM/PM

Hitting the "3" key will display either AM or PM in place of the time in the middle of the screen. The screen will remain this way for two seconds and then return to showing the time.

### Setting Alarm Signal Strength

Hitting the "4" key will sound the alarm. This is so you can set how loud the alarm will be. If you think it wouldn't wake you, then turn up the volume. If you think the alarm is too loud, then turn your TV down. To turn off the alarm after setting the volume, hit any key. The computer will return to showing the time.

### Setting the Alarm

The alarm can be set for any time of the day or night. To do this, hit key "5" then enter the time you want to be signaled (0100-1259). Do not use colons or seconds. Remember that 0100 = 01:00 and 1259 = 12:59. After you set the time, you must tell the computer whether the time the alarm is set for is AM or PM. To do this, type AM or PM then RETURN. After the alarm goes off, hit any key to stop the alarm.

### Displaying the Time That the Alarm Is Set For

To display the time that the alarm is set for, hit key "6". The time will be displayed on top of the screen with AM/PM on the bottom. The screen will return to showing the correct time after eight seconds.

### Changing the Screen Color

To change the screen color, hit key "7" or "8". Key "7" will allow the screen color to be changed to black-yellow. (See page 73 in the *Commodore 64 Programmer's Reference Guide*.) Key "8" works like the above, but allows the screen to be set to orange and gray.

### Changing Character Shape/Character Color

The character makeup for the numbers that display the time are reversed spaces or black lines. This can be changed so that the numbers can be made up of any character that can be displayed on the screen. To do this, hit key "9" and do the following.

# ALARM CLOCK

When you are asked NEW CHARACTER? hit the keys that you want to use to make up the numbers. For example, [SHIFT] @. Then hit F1 if you want reverse video or F3 for reverse off. Then hit CTRL one through eight or the Commodore logo key and one through eight to change the number's color.

As you can see, you can mix any character makeup, color and screen color to suit your liking. **C**

**Alarm Clock 64**

```
0 POKE 53281,1:POKE 53280,1
  :PRINT"[CLEAR,LEFT,BLUE]";'DRIE
5 AA$="[RVS] ":PRINT CHR$(8)'DHWG
10 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT G]":NEXT'FGXS
20 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B,
   SPACE9,SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT G]":NEXT'FGIR
30 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B,
   SPACE21,SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT G]":NEXT'FGEO
40 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B,
   SPACE9,SHFT B] [SHFT B,SPACE3,
   SHFT B] [SHFT B,SPACE3,SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT G]
   ":NEXT'FGOS
50 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B,
   SPACE21,SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT G]":NEXT'FGEQ
60 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT G] [SHFT G,SPACE3,SHFT G]
   [SHFT B,SPACE5,SHFT B] [SHFT B,
   SPACE5,SHFT B] [SHFT B] [SHFT B]
   [SHFT G]":NEXT'FGQU
63 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B,
   SPACE21,SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT G]":NEXT'FGEU
65 FOR A=1 TO 25:PRINT"[SPACE2]
   PRESS ANY KEY TO BEGIN THE PROGRAM
   [SPACE2]":NEXT'FGYU
67 FOR A=1 TO 25:PRINT"[SPACE2,SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT B,SPACE17,SHFT B] [SHFT B]
   [SHFT B] [SHFT B] [SHFT B,SPACE2]"
   :NEXT'FGYY
70 FOR A=1 TO 25:PRINT"[SHFT G]
   [SHFT G] [SHFT G] [SHFT B] [SHFT B,
   SPACE21,SHFT G] [SHFT G] [SHFT G]
   [SHFT G] [SHFT G]":NEXT'FGOS
75 FOR A=1 TO 25:PRINT"[SHFT G,SPACE3,
   SHFT G,SPACE3,SHFT B,SPACE21,
   SHFT G,SPACE3,SHFT G,SPACE3,SHFT G]
   ":NEXT'FGKV
77 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT G] [SHFT G] [SHFT G]
   [SHFT G] [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
    [SHFT G]":NEXT'FGSG
80 GET X$:IF X$=""THEN 60'EHDI
85 FOR A=1 TO 25:PRINT"[SHFT B]
   [SHFT B] [SHFT B] [SHFT B] [SHFT B]
   ONE MOMENT PLEASE[SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
   [SHFT B] [SHFT G]":NEXT'FGXD
90 FOR A=1 TO 25:PRINT"[SHFT G]
   [SHFT G] [SHFT G] [SHFT B] [SHFT B,
   SPACE21,SHFT G] [SHFT G] [SHFT G]
   [SHFT G] [SHFT G]":NEXT'FGOU
91 PM$="[SHFT Q,SPACE2,SHFT Q,SPACE7,
   SHFT Q,SPACE2]"'BDPN
92 PM$=PM$+"[DOWN,LEFT17,SHFT Q,
   SPACE2,SHFT Q,SPACE2,SHFT Q,SPACE5,
   SHFT Q,SPACE2]"'CGJB
93 PM$=PM$+"[DOWN,LEFT17,SHFT Q,
   SPACE2,SHFT Q] [SHFT Q,SPACE3,
   SHFT Q] [SHFT Q,SPACE2]"'CGDE
94 PM$=PM$+"[DOWN,LEFT17,SHFT Q,
   SPACE5,SHFT Q,SPACE2,SHFT Q]
   [SHFT Q,SPACE2,SHFT Q,SPACE2]"'CGHD
95 PM$=PM$+"[DOWN,LEFT17,SHFT Q,
   SPACE3,SHFT Q] [SHFT Q,SPACE3,
   SHFT Q,SPACE3,SHFT Q] [SHFT Q]
   "'CGJE
96 AM$="[SHFT Q,SPACE3,SHFT Q,SPACE7,
   SHFT Q,SPACE2]"'BDHS
97 AM$=AM$+"[DOWN,LEFT18,SHFT Q,
   SPACE2,SHFT Q,SPACE3,SHFT Q,SPACE5,
   SHFT Q,SPACE2]"'CGNH
98 AM$=AM$+"[DOWN,LEFT18,SHFT Q,
   SPACE3,SHFT Q] [SHFT Q,SPACE3,
   SHFT Q] [SHFT Q,SPACE2]"'CGNJ
99 AM$=AM$+"[DOWN,LEFT18,SHFT Q,
   SPACE2,SHFT Q,SPACE3,SHFT Q,SPACE2,
   SHFT Q] [SHFT Q,SPACE2,SHFT Q,
   SPACE2]"'CGNJ
100 AM$=AM$+"[DOWN,LEFT18,SHFT Q,
    SPACE2,SHFT Q] [SHFT Q] [SHFT Q,
    SPACE3,SHFT Q,SPACE3,SHFT Q]
    [SHFT Q]"'CGLQ
125 FOR A=1 TO 25:PRINT"[SHFT G]
    [SHFT G] [SHFT G] [SHFT B]
    [SHFT B] ONE MOMMENT PLEASE
    [SPACE2,SHFT G] [SHFT G] [SHFT G]
     [SHFT G] [SHFT G]":NEXT'FGJU
126 FOR A=1 TO 25:PRINT"[SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT G] [SHFT G]
    [SHFT G] [SHFT G] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT B] [SHFT B] [SHFT B]
    [SHFT G]":NEXT'FGSY
127 IF VAL(TI$)<010000 THEN 160'EOPJ
```

# ALARM CLOCK

```
128 IF VAL(TI$)=>130000 THEN 160'FONL
129 PRINT"[HOME,DOWN7,RIGHT10]
    REGISTER READS- ";TI$'BESN
130 PRINT"[DOWN,RIGHT10]
    IS THIS CORRECT SYSOP?"'BACG
140 GET X$:IF X$=""THEN 129'EIHD
150 IF X$><"N"THEN 500'EFUD
160 PRINT"[CLEAR,DOWN2,RIGHT]
    TYPE CORRECT VALUE (12-HOUR
    FORMAT)"'BAUL
165 INPUT" 010000-125959";A1$
    :GOTO 172'CIIL
170 GOTO 165'BDLD
172 IF VAL(A1$)<010000 THEN 170'EOXJ
195 IF VAL(A1$)>125959 THEN 170'EOBO
210 TI$=A1$'BGJY
300 PRINT"[HOME,DOWN16,RIGHT6]";
    TI$'BEBA
305 GOSUB 30000'BFCD
310 A3=A3+1:IF A3>200 THEN 85'FNFE
320 GOTO 300'BDCA
500 GOSUB 507'BDPA
505 GOTO 2015'BEFF
507 XC$="[DOWN,LEFT8]"'BDNM
510 K$(0)=XC$:FOR II=1 TO 8
    :K$(0)=K$(0)+AA$:NEXT
    :AA$=AA$+"[RVOFF]"'JKKN
520 K$(1)=XC$+AA$+"[RVOFF,SPACE6]
    "+AA$+"[RVOFF]"'FOJJ
530 K$(2)=XC$+"[RVOFF,SPACE7]"+AA$+"
    [RVOFF]"'ELNJ
540 K$(3)=XC$+"[RVOFF]"+AA$+"[SPACE7]
    "'ELWJ
550 K$(4)=XC$+"[RVOFF,SPACE8]"'CILI
610 K$(5)=RIGHT$(K$(0),16)'CPRF
620 K$(6)=RIGHT$(K$(1),14)'CPRG
630 K$(7)=RIGHT$(K$(2),12)'CPRH
640 K$(8)=RIGHT$(K$(3),11)'CPSI
650 K$(9)=RIGHT$(K$(4),9)'COEJ
1000 A$(0)=K$(5)+K$(1)+K$(1)+K$(1)+K$
     (1)+K$(1)+K$(1)'HPVF
1010 A$(0)=A$(0)+K$(1)+K$(1)+K$(0)
     'EACB
1020 A$(1)=K$(7)+K$(2)+K$(2)+K$(2)+K$
     (2)+K$(2)+K$(2)'HPFH
1030 A$(1)=A$(1)+K$(2)+K$(2)+K$(2)
     'EAID
1040 A$(2)=K$(5)+K$(2)+K$(2)+K$(2)+K$
     (0)+K$(3)+K$(3)'HPEJ
1050 A$(2)=A$(2)+K$(3)+K$(3)+K$(0)
     'EAKF
1060 A$(3)=K$(5)+K$(2)+K$(2)+K$(2)+K$
     (0)+K$(2)+K$(2)'HPDL
1070 A$(3)=A$(3)+K$(2)+K$(2)+K$(0)
     'EAKH
1080 A$(4)=K$(6)+K$(1)+K$(1)+K$(1)+K$
     (0)+K$(2)+K$(2)'HPCN
1090 A$(4)=A$(4)+K$(2)+K$(2)+K$(2)
     'EAOJ
1100 A$(5)=K$(5)+K$(3)+K$(3)+K$(3)+K$
     (0)+K$(2)+K$(2)'HPIG
1110 A$(5)=A$(5)+K$(2)+K$(2)+K$(0)
     'EAOC
1120 A$(6)=K$(5)+K$(3)+K$(3)+K$(3)
     +K$(0)+K$(1)+K$(1)'HPHI
1130 A$(6)=A$(6)+K$(1)+K$(1)+K$(0)
     'EAOE
1140 A$(7)=K$(5)+K$(2)+K$(2)+K$(2)+K$
     (2)+K$(2)+K$(2)'HPJK
1150 A$(7)=A$(7)+K$(2)+K$(2)+K$(2)
     'EAUG
1160 A$(8)=K$(5)+K$(1)+K$(1)+K$(1)+K$
     (0)+K$(1)+K$(1)'HPDM
1170 A$(8)=A$(8)+K$(1)+K$(1)+K$(0)
     'EASI
1180 A$(9)=K$(5)+K$(1)+K$(1)+K$(1)+K$
     (0)+K$(2)+K$(2)'HPGO
1190 A$(9)=A$(9)+K$(2)+K$(2)+K$(2)
     'EAYK
1200 A$(10)=K$(9)+K$(4)+K$(4)+K$(4)
     +K$(4)+K$(4)+K$(4)'HQRH
1210 A$(10)=A$(10)+K$(4)+K$(4)+K$(4)
     'ECKD
1230 RETURN'BAQX
2015 PRINT"[CLEAR,RIGHT10]";A$(1)
     :PRINT"[HOME,RIGHT19]";A$(0)'CNIH
2017 FOR X=1 TO 1000:NEXT'EHUF
2020 PRINT"[CLEAR]";:FOR A=9 TO 0
     STEP-1:PRINT"[HOME,RIGHT19]";
     :PRINT A$(A);'IPTG
2021 FOR X=1 TO 1000:NEXT'EHUA
2030 NEXT'BAEW
2040 PRINT"[CLEAR]"'BATY
2100 GET R$:R=VAL(R$)'DIYX
2107 X1$=LEFT$(TI$,1):X2$=MID$(TI$,2,
     1):X3$=MID$(TI$,3,1)'GLYN
2110 X4$=MID$(TI$,4,1):X5$=MID$(TI$,5,
     1):X6$=RIGHT$(TI$,1)'GLII
2120 X7$=X1$+X2$+X3$+X4$+X5$+X6$'GVLF
2130 IF X7$=AL$+"01"THEN GOSUB
     20000'FLLD
2140 IF X1$="0"THEN 2155'DHRC
2150 PRINT"[HOME,DOWN4]";A$(VAL(X1$))
     :GOTO 2160'DPWF
2155 PRINT"[HOME,DOWN4]";A$(10)'BHPH
2160 PRINT"[HOME,DOWN4,RIGHT9]";
     A$(VAL(X2$))'CKTF
2170 PRINT"[HOME,DOWN6,RIGHT18,RVS]";
     X5$'BEAG
2180 PRINT"[HOME,DOWN10,RIGHT18,RVS]";
     X6$'BETH
2190 PRINT"[HOME,DOWN4,RIGHT20]";
     A$(VAL(X3$))'CKIJ
2200 PRINT"[HOME,DOWN4,RIGHT29]";
     A$(VAL(X4$))'CKOC
2310 GOSUB 30000'BFCY
3285 IF R=0 THEN 2100'DGPN
3290 ON R GOSUB 4000,5000,6000,7000,
     8000,9000,9500,9600,40000'CVIQ
3300 GOTO 2100'BEAY
4000 PRINT"[CLEAR]":FOR S=1 TO 10'EFJA
4002 X5$=MID$(TI$,5,1):X6$=RIGHT$(TI$,
     1)'EXKF
4003 GOSUB 30000'BFCA
4010 PRINT"[HOME,DOWN2,RIGHT11]";
     A$(VAL(X5$))'CKVB
4015 PRINT"[HOME,DOWN2,RIGHT20]";
     A$(VAL(X6$))'CKCH
4020 GET X1$:IF X1$=" "THEN 4002'ELEC
4030 NEXT:PRINT"[CLEAR]":RETURN'DCBB
5000 PRINT"[CLEAR]":G1$=G3$'CHHA
```

*Continued on Pg. 93*

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# ALARM CLOCK

```
5001 PRINT"[HOME]":G1$=G3$'CHJA
5170 PRINT"[HOME,DOWN4,RIGHT5]";
     G3$'BEOH
5180 PRINT"[HOME,DOWN](P)M OR (A)M ?
     ";'BBWK
5220 GET G1$:IF G1$=""THEN GOSUB
     30000'FMSG
5222 PRINT G1$'BDCE
5223 IF G1$="A"THEN G1$=AM$
     :GOTO 5230'FODK
5224 IF G1$="P"THEN G1$=PM$
     :GOTO 5230'FOIL
5225 G3$=G1$:GOTO 5001'CLQJ
5230 PRINT"[CLEAR]":RETURN'CBTD
6000 PRINT"[CLEAR,DOWN3,RIGHT7]";
     G1$'BECB
6010 FOR A=1 TO 1000:NEXT'EHWC
6020 PRINT"[CLEAR]":RETURN'CBTB
7000 S=54272'BGJB
7010 FOR L=0 TO 24:POKE S+L,0
     :NEXT'GKJF
7030 POKE S+14,5'CFOE
7040 REM POKES+18,16'BLFG
7050 POKE S+3,1'CEKG
7060 POKE S+24,143'CHOH
7070 POKE S+6,240'CGOI
7080 POKE S+4,65'CFTJ
7090 FR=5389'BGJK
7100 GET D$'BCJB
7110 FQ=FR+PEEK(S+27)*3.5'FMTH
7120 HF=INT(FQ/256):LF=FQ-HF*256'GTOK
7130 POKE S+0,LF:POKE S+1,HF'ELII
7135 GOSUB 30000'BFCJ
7140 IF D$=""THEN 7100'DGUH
7150 POKE S+24,0:R=0:RETURN'EJOJ
8000 PRINT"[CLEAR]"'BATB
8010 INPUT"ALARM SETTING 0100-1259";
     AL$'BEQI
8015 IF VAL(AL$)>1259 OR
     VAL(AL$)<0100 THEN PRINT"[UP2]"
     :GOTO 8010'JXYR
8017 IF LEN(AL$)>4 THEN PRINT"[UP2]"
     :GOTO 8010'GLLP
8020 INPUT"PM OR AM";G2$'BEKF
8022 IF G2$=PM$THEN 8030'DKNI
8024 IF G2$=AM$THEN 8030'DKDJ
8025 IF G2$="PM"THEN G2$=PM$
     :GOTO 8030'FOON
8026 IF G2$="AM"THEN G2$=AM$
     :GOTO 8030'FOJO
8028 PRINT"[UP2]":GOTO 8020'CFXN
8030 PRINT"[CLEAR]";:RETURN'CCWF
9000 PRINT"[CLEAR]"'BATC
9010 PRINT"[HOME,DOWN2]";
     A$(VAL(LEFT$(AL$,1)))'DOBG
9020 PRINT"[HOME,DOWN2,RIGHT9]";
     A$(VAL(MID$(AL$,2,1)))'DQVJ
9030 PRINT"[HOME,DOWN2,RIGHT18]";
     A$(VAL(MID$(AL$,3,1)))'DQCL
9040 PRINT"[HOME,DOWN2,RIGHT27]";
     A$(VAL(RIGHT$(AL$,1)))'DOMN
9050 PRINT"[HOME,DOWN13,RIGHT12]";
     G2$'BENJ
9460 FOR A=1 TO 200'DFSN
9470 GOSUB 30000'BFCN
9480 NEXT'BAEN
9490 PRINT"[CLEAR]":RETURN'CBTP
9500 PRINT"[HOME,DOWN21]
     HIT 1-8 TO CHANGE COLORS.
     (BLK-YEL)"'BALQ
9505 GOSUB 30000'BFCM
9510 GET RR$:IF VAL(RR$)<1 OR
     VAL(RR$)>8 THEN 9505'IUYQ
9515 PRINT"[HOME,DOWN,SPACE35]"'BAMS
9520 POKE 53281,VAL(RR$)-1'DMCM
9530 POKE 53280,VAL(RR$)-1:RETURN'ENUO
9600 PRINT"[HOME,DOWN21]
     HIT 1-8 TO CHANGE COLORS.
     (ORA-GREY3)"'BATS
9605 GOSUB 30000'BFCN
9610 GET RR$:IF VAL(RR$)<1 OR
     VAL(RR$)>8 THEN 9605'IUAR
9615 PRINT"[HOME,DOWN,SPACE37]"'BABT
9620 POKE 53281,VAL(RR$)+7'DMHN
9630 POKE 53280,VAL(RR$)+7:RETURN'ENAP
20000 IF G1$><G2$THEN RETURN'FGRV
20010 GOSUB 7000'BEIT
20100 RETURN'BAQS
30000 IF TI$="120000"THEN 30030'DIUW
30001 IF TI$=AL$+"01"THEN 20000'ELJY
30003 IF VAL(LEFT$(TI$,
     2))<13 THEN 30020'FQOC
30005 ZZ=VAL(LEFT$(TI$,2))
     :IF ZZ>12 THEN XX$=STR$(ZZ-12)
     +RIGHT$(TI$,4)'LHQH
30006 IF ASC(XX$)=32 THEN
     XX$="0"+RIGHT$(XX$,5)'HRCB
30007 IF LEN(XX$)>6 THEN
     XX$="0"+RIGHT$(XX$,5)'HQBC
30015 TI$=XX$'BGUB
30020 RETURN'BAQU
30030 IF G1$=AM$THEN G3$=PM$'EMQB
30040 IF G1$=PM$THEN G3$=AM$'EMQC
30050 FOR A=1 TO 1000:NEXT:G1$=G3$
     :RETURN'GPEE
40000 PRINT"[HOME,DOWN16]"'BAMU
40010 PRINT"NEW CHARACTER? ";'BBOY
40012 GOSUB 30000'BFCX
40015 GET AA$:IF AA$=""THEN 40012'EMCF
40016 IF ASC(AA$)=13 OR ASC(AA$)=141
     OR ASC(AA$)=34 THEN 40000'KCBH
40017 PRINT AA$'BDMD
40018 PRINT"HIT <F1> FOR RVS-ON OR
     <F3> FOR RVS-OFF ";'BBSH
40019 GOSUB 30000'BFCF
40020 GET BB$:IF BB$=""THEN 40019'EMNB
40030 IF BB$="[F1]"THEN AA$="[RVS]
     "+AA$:PRINT"RVS-ON"
     :GOTO 40045'HQQB
40040 IF BB$="[F3]"THEN AA$="[RVOFF]
     "+AA$:PRINT"RVS-OFF"
     :GOTO 40045'HQJC
40043 PRINT"[UP2]":GOTO 40018'CGYE
40045 PRINT"HIT <CTRL 1-8> OR
     <COMMODORE 1-8> FOR[SPACE3]
     COLOR";'BBDI
40047 GOSUB 30000'BFCA
40050 GET BB$:IF BB$=""THEN 40047'EMOE
40051 PRINT BB$'BDOB
40055 GOSUB 507'BDPF
40060 PRINT"[CLEAR]":Z=0:RETURN'DEGD
```

BY BRUCE JAEGER

# In Between: A Card Game for the VIC 20 or Commodore 64

"In Between" has always been one of my favorite card games, and because it isn't as complicated as games like cribbage, poker or bridge, I felt it was a natural to squeeze into the unexpanded VIC 20. And those cards sure look good with VIC's color graphics!

Playing the game itself is fairly simple (probably why I like it). First you are dealt two cards, face up. Then you decide whether to bet that the next card will be "in between" the first two. That's it. If you're dealt a four and a jack, you win if the third card is, for instance, a seven. Another jack, or a two, or any other card not *between* the four and the jack and you lose.

Some game variations allow splitting pairs into two separate hands, and some allow calling the ace either high or low. Unfortunately, there wasn't room for that in 3583 bytes. Besides, me and the boys don't play that way anyhow.

Type in the program carefully, because the graphics depend on having all the control characters and spaces exactly as listed. I'm sorry it's so packed, but I had to make a choice between REM statements and the multiplayer option. (And it's a lot more fun with several people!) The game will also run with expansion memory.

A version for the Commodore 64 is also included. With the 64, there was room for sound effects. Feel free to make use of the short machine language routine called by "SYS 50000." (It's poked into memory at the beginning of the program.) This is a "quieting" routine that turns off the 64's sound with less of a "thud" than doing it in BASIC. **C**

## VIC Version

```
100 PRINT"[CLEAR,RVS,BLACK]IN BETWEEN"
    :OF=30720:SC=7680
105 IF PEEK(44)=18 THEN OF=33792
    :SC=4096
110 POKE 36879,122:DIM C%(52)
    :K$="[RIGHT13]"
120 E$="[HOME,RVS,GREEN,SPACE21,HOME,
    DOWN,SPACE21]"
130 INPUT"[DOWN]HOW MANY PLAYERS
    [SPACE2]1[LEFT3]";N
140 IF N=1 THEN M(1)=100:GOTO 160
150 FOR X=1 TO N:PRINT"[DOWN]
    NAME OF PLAYER #";X:PRINT
    :INPUT N$(X):M(X)=100:NEXT
160 PRINT"[CLEAR]EACH PLAYER BEGINS"
    :PRINT"[DOWN]WITH $100.[SPACE2]
    THE ANTE"
170 PRINT"[DOWN]PER DEAL IS $5"
    :PRINT"[DOWN]ACES ARE ALWAYS HIGH"
180 PRINT"[DOWN]NO DOUBLES[DOWN]"
    :GOSUB 500:GOSUB 950:KT=0
190 PRINT"[HOME,DOWN2]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,SPACE12]":NEXT
200 PRINT"[HOME,DOWN11]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,RIGHT,SPACE12]"
    :NEXT
210 PRINT"[HOME,DOWN2]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,SPACE12]":NEXT
220 GOSUB 820:IF P>0 THEN 270
230 IF N=1 THEN P=5
240 PRINT E$;"[HOME,BLACK]
    POT'S EMPTY!":PRINT"EVERYBODY
    ANTE UP!":GOSUB 590:PRINT E$
250 FOR X=1 TO N:IF M(X)>=5 THEN P=P+5
    :M(X)=M(X)-5
260 NEXT
270 KT=KT+1:IF KT>N THEN KT=1
280 IF M(KT)<=0 THEN 270
290 IF N=1 THEN 320
300 PRINT E$:PRINT"[HOME,RVS,BLUE]";
    N$(KT);"'S TURN"
310 GOSUB 900:D=500:GOSUB 600
320 M(KT)=M(KT)-5:P=P+5
330 IF CL<6 THEN PRINT E$"[HOME]"
    :GOSUB 500
340 GOSUB 900
350 GOSUB 540:C1=C%(C):C%(C)=0:CD=1
    :CA=C1:GOSUB 760:C1=CA:GOSUB 610
360 GOSUB 540:C2=C%(C):C%(C)=0:CD=2
    :CA=C2:GOSUB 760:C2=CA:GOSUB 610
370 IF ABS(C1-C2)>1 THEN 390
380 PRINT"[DOWN,RVS]TOUGH LUCK!"
    :GOSUB 590:PRINT"[UP,RVS,GREEN,
    SPACE11]":GOTO 480
390 INPUT"[HOME,DOWN,RVS,GREEN]
    YOUR BET[SPACE3]0[LEFT3]";B
400 IF B<=0 THEN 190
410 IF B>M(KT)OR B>P THEN PRINT"[HOME,
    DOWN,RVS,RED]TOO MUCH!!![RVS,
    GREEN,SPACE8]":GOSUB 590:GOTO 390
420 M(KT)=M(KT)-B:P=P+B
430 GOSUB 540:C3=C%(C):C%(C)=0:CD=3
    :CA=C3:GOSUB 760:C3=CA:GOSUB 610
440 CW=C1:CH=C2:IF C1>C2 THEN CW=C2
    :CH=C1
450 IF C3<=CW OR C3>=CH THEN PRINT E$
    :PRINT"[HOME,RVS,BLACK]YOU LOSE!"
    :GOTO 470
460 PRINT E$:PRINT"[HOME,RVS,PURPLE]
    A WINNER!":M(KT)=M(KT)+2*B:P=P-2*B
470 GOSUB 900:GOSUB 590
480 IF M(KT)<=5 THEN GOSUB 990
490 PRINT E$:GOTO 190
500 PRINT"[RVS,PURPLE]SHUFFLING[BLACK]
    ":FOR X=1 TO 52:C%(X)=0:NEXT
    :FOR X=1 TO 52
510 Y=INT(RND(1)*52)+1
520 IF C%(Y)=0 THEN C%(Y)=X:NEXT:CL=52
    :PRINT E$:RETURN
530 GOTO 510
540 C=INT(RND(1)*52)+1:IF C%(C)=0
    THEN 540
550 CL=CL-1:IF C%(C)<14 THEN S=1
    :RETURN
```

# GAME PROGRAMS

```
560 IF C%(C)<27 THEN S=2:RETURN
570 IF C%(C)<40 THEN S=3:RETURN
580 S=4:RETURN
590 D=1100
600 FOR DE=1 TO D:NEXT DE:RETURN
610 SP$="":VT$="[HOME,DOWN3]":BR$=""
    :BL$=""
620 IF CD=2 THEN SP$="[RIGHT7]"
630 IF CD=3 THEN VT$=VT$+"[DOWN8]"
    :SP$="[RIGHT4]":BR$="[CMDR G]"
    :BL$="[LEFT,CMDR M]"
640 S$=MID$("[SHFT S,SHFT Z,SHFT A,
    SHFT X]",S,1):SU$="[PURPLE]"
    :IF S>2 THEN SU$="[BLACK]"
650 N1$=STR$(CA):L=LEN(N1$)
660 IF L=2 THEN N$=RIGHT$(N1$,1)+" "
670 IF CA=10 THEN N$="10":N1$=N$
680 IF CA=11 THEN N$="J ":N1$=" J"
690 IF CA=12 THEN N$="Q ":N1$=" Q"
700 IF CA=13 THEN N$="K ":N1$=" K"
710 IF CA=14 THEN N$="A ":N1$=" A"
720 IF CD=3 THEN PRINT"[HOME,DOWN10,
    RIGHT4,BLACK,CMDR @,RIGHT2,
    CMDR @2]"
730 PRINT VT$;SP$;SU$;BL$;N$;"[SPACE2]
    ";S$;BR$:BL$=""
740 FOR X=1 TO 3:PRINT SP$;"[SPACE5]"
    :NEXT:PRINT SP$;"[SPACE2]";S$;"
    [SPACE2]"
750 FOR X=1 TO 3:PRINT SP$;"[SPACE5]"
    :NEXT:PRINT SP$;S$;"[SPACE2]";N1$
    :PRINT"[BLACK]":RETURN
760 IF CA<14 THEN 800
770 IF CA<27 THEN CA=CA-13:GOTO 800
780 IF CA<40 THEN CA=CA-26:GOTO 800
790 CA=CA-39
800 IF CA=1 THEN CA=14
810 RETURN
820 IF N=1 AND M(N)<=5 THEN PRINT"
    [CLEAR,RVS,PURPLE]SORRY,
     YOU'RE OUT!":GOTO 1010
830 IF N=1 THEN RETURN
840 J=0:FOR H=1 TO N
850 IF M(H)>5 THEN J=J+1:W1=H
860 NEXT
870 IF J>1 THEN RETURN
880 POKE 36879,252:PRINT"[CLEAR,BLACK]
    ";N$(W1);"[RVOFF] IS THE"
    :PRINT"[DOWN]WINNER WITH $";
890 R=1:KT=W1:GOSUB 900:PRINT M$
    :GOTO 1010
900 M=M(KT):M1=M-INT(M)
    :M$=STR$(M1)+"00":M$=STR$(INT(M))
    +"."+MID$(M$,2,2)
910 IF R=1 THEN RETURN
920 P1=P-INT(P):P$=STR$(P1)+"00"
    :P$=STR$(INT(P))+"."+MID$(P$,2,2 )
930 PRINT"[HOME,DOWN3]"K$"[RED]
    YOU HAVE":PRINT K$"[SPACE8]"
     :PRINT K$"[UP]$"M$
940 PRINT K$"[DOWN]POT:[SPACE4]"
    :PRINT K$"[SPACE8]"
```

C


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```
    :PRINT K$"[UP]$"P$"[RVS,WHITE]"
    :RETURN
950 POKE 36879,93:PRINT"[CLEAR]";
    :FOR Z=1 TO 23:PRINT"[RVS,GREEN,
    SPACE21]":NEXT Z
960 FOR Z=SC+21 TO SC+505 STEP 22
    :POKE Z,160:POKE Z+OF,5:NEXT Z
970 FOR Z=SC+483 TO SC+505:POKE Z,160
    :POKE Z+OF,5:NEXT Z
980 POKE 36879,29:RETURN
990 IF N=1 THEN RETURN
1000 PRINT E$:PRINT"[HOME,RVS,BLACK]
     YOU'RE OUT OF IT,"
     :PRINT"[RVS]"N$(KT):GOSUB 590
     :RETURN
1010 D=4500:GOSUB 590:INPUT"[DOWN2]
     PLAY AGAIN[SPACE3]Y[LEFT3]";A$
1020 IF A$="Y"THEN RUN
1030 PRINT"[CLEAR]":END
```

### Commodore 64 Version

```
100 GX=53272:UC=21:LC=23:SC=1024
    :CO=55296::OF=CO-SC'HPWJ
110 BO=53280:BC=53281:SD=54272'DXND
120 REM POKE ML "QUIET" ROUTINE'BNKD
130 FOR X=50000 TO 50018'DLIC
140 READ A:POKE X,A:NEXT'DGAC
150 DATA 169,0,133,253,169,212,133,
    254'BEFG
160 DATA 160,0,152,145,253,200,192,
    24'BDVG
170 DATA 208,249,96'BKFE
180 PRINT"[CLEAR,SPACE3,RVS,BLACK]
    IN BETWEEN":POKE GX,UC'CGUK
190 POKE BC,7:POKE BO,2:DIM C%(52)
    :K$="[RIGHT13]"'ETRL
200 PA$="[RVS,GREEN,SPACE39]"'BDSC
210 E$="[HOME]"+PA$+PA$+PA$'ELYC
220 INPUT"[DOWN,SPACE3]
    HOW MANY PLAYERS[SPACE2]1[LEFT3]";
    N'BCQG
230 IF N=0 THEN 220'DFUB
240 IF N=1 THEN M(1)=100:GOTO 260'FNHF
250 FOR X=1 TO N:INPUT"[DOWN,SPACE3]
    NAME OF PLAYER #";N$(X):M(X)=100
    :NEXT'GTRN
260 PRINT"[CLEAR,DOWN,SPACE3]
    EACH PLAYER BEGINS WITH
    $100.00"'BACL
270 PRINT"[DOWN,SPACE3]
    THE ANTE PER DEAL IS $5.00"'BAVK
280 PRINT"[DOWN,SPACE3]
    ACES ARE ALWAYS HIGH"'BAUK
290 PRINT"[DOWN,SPACE3]NO DOUBLES
    [DOWN]":GOSUB 630:GOSUB 1090
    :KT=0'ENEN
300 PRINT"[HOME,DOWN2]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,SPACE12]"
    :NEXT'GGAD
310 PRINT"[HOME,DOWN11]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,RIGHT,SPACE12]"
    :NEXT'GGNF
320 PRINT"[HOME,DOWN2]":FOR Z=1 TO 9
    :PRINT"[RVS,GREEN,SPACE12]"
    :NEXT'GGAF
330 GOSUB 960:IF P>0 THEN 380'EJYE
340 IF N=1 THEN P=5'EEDE
350 PRINT E$;"[HOME,BLACK]
    POT'S EMPTY!":PRINT"[HOME,DOWN]
    EVERYBODY ANTE UP!":GOSUB 720
    :PRINT E$'ELBP
360 FOR X=1 TO N:IF M(X)>=5 THEN P=P+5
    :M(X)=M(X)-5'LWTP
370 NEXT'BAEE
380 KT=KT+1:IF KT>N THEN KT=1'GMLM
390 IF M(KT)<=0 THEN 380'EJIK
400 IF N=1 THEN 430'DFYA
410 PRINT E$:PRINT"[HOME,RVS,BLUE]";
    N$(KT);"'S TURN"'CLRE
420 GOSUB 1040:D=500:GOSUB 740'DNUE
430 M(KT)=M(KT)-5:P=P+5'EPSH
440 IF CL<6 THEN PRINT E$"[HOME]"
    :GOSUB 630'FJFH
450 GOSUB 1040'BEGE
460 GOSUB 670:C1=C%(C):C%(C)=0:CD=1
    :CA=C1:GOSUB 900:C1=CA
    :GOSUB 750'IPER
470 GOSUB 670:C2=C%(C):C%(C)=0:CD=2
    :CA=C2:GOSUB 900:C2=CA
    :GOSUB 750'IPIS
480 IF ABS(C1-C2)>1 THEN 510'FKSL
490 PRINT"[DOWN,RVS]TOUGH LUCK!"
    :GOSUB 1180:GOSUB 720
    :PRINT"[UP,RVS,GREEN,SPACE11]
    "'EKLQ
500 PRINT E$:GOTO 610'CGQB
510 PRINT E$:INPUT"[HOME,DOWN,RVS,
    GREEN]YOUR BET[SPACE3]0[LEFT3]";
    B$'CGNH
520 L=LEN(B$):B$=RIGHT$(B$,L-10)
    :B=VAL(B$)'HWTK
530 IF B<=0 THEN 300'EFFF
540 IF B>M(KT)OR B>P THEN PRINT"[HOME,
    DOWN,RVS,RED]TOO MUCH![RVS,GREEN,
    SPACE8]":GOSUB 1180:GOSUB 720'IRYP
545 IF B>M(KT)OR B>P GOTO 510'FLEN
550 M(KT)=M(KT)-B:P=P+B'EPTK
560 GOSUB 670:C3=C%(C):C%(C)=0:CD=3
    :CA=C3:GOSUB 900:C3=CA
    :GOSUB 750'IPMS
570 CW=C1:CH=C2:IF C1>C2 THEN CW=C2
    :CH=C1'HXSQ
580 IF C3<=CW OR C3>=CH THEN PRINT E$
    :PRINT"[HOME,RVS,BLACK]YOU LOSE!"
    :GOSUB 1260:GOTO 600'LUQV
590 PRINT E$:PRINT"[HOME,RVS,PURPLE]
    A WINNER!":GOSUB 1360
    :M(KT)=M(KT)+2*B:P=P-2*B'JBLX
600 GOSUB 1040:GOSUB 720'CICC
610 IF M(KT)<=5 THEN GOSUB 1130'FKPG
620 PRINT E$:GOTO 300'CGME
630 PRINT"[RIGHT3,RVS,RED]SHUFFLING
    [BLACK]":FOR X=1 TO 52:C%(X)=0
    :NEXT:FOR X=1 TO 52'JSWQ
640 Y=INT(RND(1)*52)+1'FJJJ
650 IF C%(Y)=0 THEN C%(Y)=X:NEXT:CL=52
    :PRINT E$:RETURN'IWCO
660 GOTO 640'BDJH
```

```
670 C=INT(RND(1)*52)+1:IF C%(C)=0
    THEN 670'ITNQ
680 CL=CL-1:IF C%(C)<14 THEN S=1
    :RETURN'HQQQ
690 IF C%(C)<27 THEN S=2:RETURN'FKWO
700 IF C%(C)<40 THEN S=3:RETURN'FKSG
710 S=4:RETURN'CDBE
720 D=800'BEQE
730 REM DELAY SUBROUTINE'BPOJ
740 FOR DE=1 TO D:NEXT DE:RETURN'FIAJ
750 SP$="":VT$="[HOME,DOWN3]":BR$=""
    :BL$=""'EPLM
760 IF CD=2 THEN SP$="[RIGHT7]"'EGYL
770 IF CD=3 THEN VT$=VT$+"[DOWN6]"
    :SP$="[RIGHT4]":BR$="[CMDR G]"
    :BL$="[LEFT,CMDR M]"'IVFV
780 S$=MID$("[SHFT S,SHFT Z,SHFT A,
    SHFT X]",S,1):SU$="[PURPLE]"
    :IF S>2 THEN SU$="[BLACK]"'HSLW
790 N1$=STR$(CA):L=LEN(N1$)'EOUP
800 IF L=2 THEN N$=RIGHT$(N1$,
    1)+" "'GLFI
810 IF CA=10 THEN N$="10":N1$=N$'FMFJ
820 IF CA=11 THEN N$="J "
    :N1$=" J"'FKHK
830 IF CA=12 THEN N$="Q "
    :N1$=" Q"'FKWL
840 IF CA=13 THEN N$="K "
    :N1$=" K"'FKLM
850 IF CA=14 THEN N$="A "
    :N1$=" A"'FKRN
860 IF CD=3 THEN PRINT"[HOME,DOWN8,
    RIGHT4,BLACK,CMDR @,RIGHT2,
    CMDR @2]"'EDAP
870 PRINT VT$;SP$;SU$;BL$;N$;"[SPACE2]
    ";S$;BR$:BL$=""'CFYR
880 FOR X=1 TO 2:PRINT SP$;"[SPACE5]"
    :NEXT:PRINT SP$;"[SPACE2]";S$;"
    [SPACE2]"'GSFT
890 FOR X=1 TO 2:PRINT SP$;"[SPACE5]"
    :NEXT:PRINT SP$;S$;"[SPACE2]";N1$
    :PRINT"[BLACK]":RETURN'IXWW
900 IF CA<14 THEN 940'DHGG
910 IF CA<27 THEN CA=CA-13
    :GOTO 940'GOAK
920 IF CA<40 THEN CA=CA-26
    :GOTO 940'GOYL
930 CA=CA-39'CGII
940 IF CA=1 THEN CA=14'EHBL
950 RETURN'BAQI
960 IF N=1 AND M(N)<=5 THEN PRINT"
    [CLEAR,RVS,PURPLE]SORRY! YOU'RE
    OUT!":GOTO 1150'IMXW
970 IF N=1 THEN RETURN'ECPM
980 J=0:FOR H=1 TO N'EGEP
990 IF M(H)>5 THEN J=J+1:W1=H'GMSS
1000 NEXT'BAES
1010 IF J>1 THEN RETURN'ECKV
1020 POKE BO,8:POKE BC,4
     :PRINT"[CLEAR,BLACK]";N$(W1);"
     [RVOFF] IS THE":PRINT"[DOWN]
     WINNER WITH $";'EULI
1030 R=1:KT=W1:GOSUB 1040:PRINT M$
     :GOTO 1150'FULD
1040 M=M(KT):M1=M-INT(M)
     :M$=STR$(M1)+"00":M$=STR$(INT(M))
     +"."+MID$(M$,2,2)'NLYO
1050 IF R=1 THEN RETURN'ECTA
1060 P1=P-INT(P):P$=STR$(P1)+"00"
     :P$=STR$(INT(P))+"."+MID$(P$,2,
     2 )'MEFO
1070 PRINT"[HOME,DOWN3]"K$"[RED]
     YOU HAVE":PRINT K$"[SPACE8]"
     :PRINT K$"[UP]$"M$'DKSI
1080 PRINT K$"[DOWN]POT:[SPACE4]"
     :PRINT K$"[SPACE8]"
     :PRINT K$"[UP]$"P$"[RVS,WHITE]"
     :RETURN'ELMJ
1090 POKE BC,5:POKE BO,5
     :PRINT"[CLEAR]";:FOR Z=1 TO 23
     :PRINT PA$:NEXT Z'IWDM
1100 FOR Z=SC+39 TO SC+999 STEP 40
     :POKE Z,160:POKE Z+OF,5
     :NEXT Z'KBNG
1110 FOR Z=SC+859 TO SC+999:POKE Z,160
     :POKE Z+OF,5:NEXT Z'JAIG
1120 POKE BO,5:POKE BC,1:RETURN'DKEA
1130 IF N=1 THEN RETURN'ECPY
1140 PRINT E$:PRINT"[HOME,RVS,BLACK]
     YOU'RE OUT OF IT,"
     :PRINT"[RVS]"N$(KT):GOSUB 720
     :RETURN'FPUJ
1150 D=4500:GOSUB 720:INPUT"[DOWN2]
     PLAY AGAIN[SPACE3]Y[LEFT3]";
     A$'DNRI
1160 IF A$="Y"THEN RUN'ECTD
1170 PRINT"[CLEAR]":END'CBFC
1180 REM HONK!'BFXD
1190 SYS 50000:REM CALL SILENCE
     ROUTINE'CYKK
1200 POKE 54296,15:POKE 54277,64'CRMY
1210 POKE 54278,128:POKE 54273,11'CSDA
1220 POKE 54272,210:POKE 54276,17'CSXB
1230 D=250:GOSUB 740'CINA
1240 POKE 54276,16'BIYB
1250 SYS 50000:RETURN'CGPC
1260 REM DOWNSOUND'BJEE
1270 SYS 50000'BFVD
1280 POKE SD+24,15:POKE SD+5,192'EPWI
1290 POKE SD+6,250'CHIG
1300 FOR XX=240 TO 20 STEP-5'FIIB
1310 POKE SD+1,XX'CGDY
1320 POKE SD+4,17'CGJA
1330 NEXT'BAEY
1340 SYS 50000'BFVB
1350 RETURN'BAQB
1360 REM WINSOUND'BIGF
1370 SYS 50000'BFVE
1380 POKE SD+24,15:POKE SD+5,192'EPWJ
1390 POKE SD+6,250'CHIH
1400 FOR XX=1 TO 10'DFZA
1410 POKE SD+1,100'CHWA
1420 POKE SD+4,17'CGJB
1430 D=30:GOSUB 740'CHLC
1440 POKE SD+1,150'CHCD
1450 POKE SD+4,17'CGJE
1460 NEXT'BAED
1470 SYS 50000'BFVF
1480 RETURN'BAQF
```

BY BETSY BYRNE

# Hug a Robot Today

I met Hero Jr. at the 1984 Summer Consumer Electronics Show, and it was love at first sight (I think he liked me a little bit, too). One might say that a great deal of Jr.'s personality was formed at the International Personal Robotics Conference (IPRC), even though he didn't attend. The Heath Company's design team responsible for Jr.'s creation attended seminars and listened to literally *hundreds* of robot lovers describe their "dream robot"—then went home to Benton Harbor, Michigan, and built a robot that comes very close to fulfilling those dreams.

The consensus of show attendees and robot experts at the IRPC seemed to be that a truly useful personal robot would combine the qualities of a companion, pet, personal secretary and security device, and that the necessary technology is here, now, just waiting for someone to put it all together. Wayne Wilson, Product Line Manager for General Consumer Products at Heath, and the rest of the Hero Jr. team have done just that—put hardware technology together with software technology, and created an affordable (less than $1,000) home and family robot.

Hero Jr. looks a lot like his Heath predecessor, Hero 1. He has the same economical silver body (though a bit smaller), and top-mounted keyboard. But he doesn't have an arm. Now before you jump out of your chair shouting, "What kind of robot doesn't have an arm!" let me tell you about all the features he *does* have. I can practically guarantee that you will not even notice the lack of grasping appendages, particularly if you consider that *safe* personal robot grippers can only lift about 16 ounces and must be positioned and "trained" with a special device to execute most simple movements.

Far more important to my way of thinking is Jr.'s winning personality, consisting of 32K of ROM, generating six different attributes or personality traits. These traits don't include traditional human traits, such as ill-humor or a liking for expensive food, but instead consist of specific abilities Jr. loves to show off: singing, speaking, exploring and playing.

*Hero Jr. is never really turned off, and he will travel around singing songs or trying to find someone to play a game with him, exploring with his built-in sonar and seeking out humans where humans are likely to be found.*

Hero Jr. is never really turned off, you see, and he will travel around singing songs or trying to find someone to play a game with him, exploring his environment with built-in sonar, and seeking out humans or areas where humans are likely to be found. Each robot has a certain mix of attributes set at the factory, but his owner has the option of changing the level or frequency of their performance with the keypad on top of Jr.'s head (i.e., you might want to set him to be seen and not heard, or to speak only when spoken to, like a good little robot).

His keypad, rather than being an entry device for machine language programming (as Hero 1's is), consists of commands that allow the most inexperienced user to communicate with him. If a would-be robot aficionado is in doubt as to what a particular key does, he or she need only press that key along with the help key, for a complete verbal description from Jr. himself.

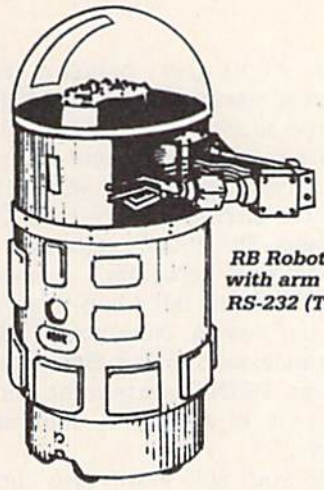
Jr. also boasts a built-in cartridge port that invites his owner to add both cartridge games and the Hero Jr. BASIC cartridge, options in the $20 to $40 range. And such games! Jr. is completely interactive with humans: he speaks and you answer him by clapping your hands in a prearranged code. I played a version of the game "Animal" with him. I thought of an animal, and he tried to guess it by asking questions such as, "Does it have a tail?" When I stumped him, he said, "I give up! You're too smart for me!" Or another time, in an unbelievable accent, "I lost to a huu-man!" Simple games that are old hat on personal computers take on new life with the added dimensions of speech and interaction with an adversary as interesting as Hero Jr.

Hero Jr. is designed to be a member of the family. He does have a sleep mode designed to conserve power and allow recharging. His rechargeable 12-volt gel batteries last eight to 12 hours between charges, and he will vocally let you know when he needs recharging. If he does not get a needed charging, he will shut down to conserve power, and in an energy crisis, will enter a "hibernation" state in which his 100-year clock can survive for many years. At night, Jr. will guard your house as well as any nightman or German shepherd, greeting intruders with a request for a password-code of hand claps that his owner sets or changes at will. If he fails to receive the code, he exclaims, "You ARE an In-TRU-der! I am calling the po-LICE!" Which he then does, provided he's equipped with an optional link to your Heath-built security system.

After hearing him demonstrate his "In-TRU-der" routine, I would venture to say that any burglar would be long gone within minutes of this surprising exchange of words with the little robotic protector. When his stint at guard duty is over for the night, Jr. will appear at your bedside (if requested) and cheerfully wake you, informing you of the time, and reminding you of special days, such as birthdays and anniversaries.

Children will delight in Jr.'s snappy phrases and comical songs, including

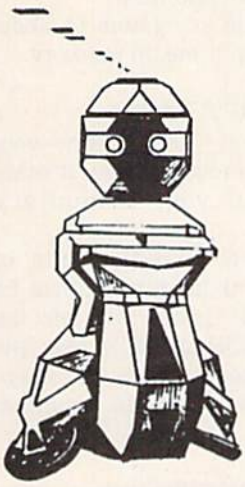
DON JONES



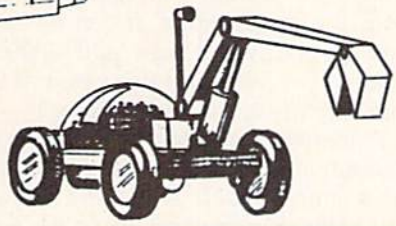
*RB Robot with arm and RS-232 (TINY BASIC)*

*HERO with five-axis arm and RS-232 interface (Heath/Zenith Co.)*

*HERO JR. from Heath/Zenith and RS-232 connection*



*Talking TOPO with infrared interface and base connector*



*A Hobby Robot with interface from Spectron Corporation*

"All Good Robots Sing This Song" (to the tune of "Camptown Races") and "Old MacDonald Had a Robot." No one could fail to be moved by the little robot's plight, when, as he explores his environment and finds he has run himself into a spot too tight to get out of, shouts, "Help, HELP!".

If he bumps into something (a sonar-equipped robot has been likened to a blind man trying to explore with a nerf bat), Jr. will sometimes politely say, "Excuse me," but more often he is apt to exclaim, "Out of my way, turkey!" If Jr. is left alone, he will apply all his sensors to the task of seeking out human companionship, and upon finding what he thinks is a person, he inquires, "Are you my HUU-MAN?"

In Hero Jr., children will find a willing companion and playmate, never too busy to sing a song with them or play a game, and in the back of his manual, they will find a surprise meant just for them (I won't give away the surprise). According to Heath spokespeople, many new educational games on cartridge are in the works for Jr.

I could go on and on about my new little friend—I listened to Wayne Wilson recite Jr.'s features for more than two hours without repeating himself—but this is supposed to be a *short* description. Hero Jr. costs just under $1,000 assembled. Adding infrared sensors and a remote control device costs $250 more. He may someday be marketed as a kit, at a lower price. Heath plans to retail him through department stores as well as computer specialty stores. Contact the company for more information. With his Hero Jr. BASIC cartridge, he is fully (and easily) programmable with any personal computer equipped with an RS232. C

## Robot Manufacturers

**Topo, B.O.B. and Fred:**
Androbot Inc.
101 E. Daggett Drive
San Jose, CA 95124
(408) BOB-TOPO

**RB Robot:**
RB Robot Corporation
18301 W. Tenth Avenue
Suite 310
Golden, CO 80401
(303) 279-5525

**Hero and Hero Jr.:**
Heath/Zenith (Heath Co.)
Hilltop Road
St. Joseph, MI 49085
(616) 982-3205

**Hubot:**
Hubotics
6352-D Corte Del Abeto
Carlsbad, CA 92008
(619) 438-9028

**Marvin Mark I:**
Iowa Precision Robotics, Ltd.
908 Tenth Street
Milford, Iowa 51351
(712) 388-2047

**Robot I:**
Analog Micro Systems
5660 Valmont Road
Boulder, CO 80301
(303) 444-6809

**Move-It Robot Kits:**
New Tech Promotions
2265 Westwood Blvd.
Suite 248
Los Angeles, CA 90024
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**Hobby Robots for VIC 20 and 64:**
Spectron Instrument Corporation
1342 W. Cedar Avenue
Denver, CO 80223
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## Robot Newsletters and Magazines

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Peterborough, NH 03458
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***Robotics Tomorrow***
200 California Avenue
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Berkeley, CA 94709
(415) 524-7115

BY JANE G. REH

# Hands-On, Beginning Programmers!

The following is a chapter excerpted from the *Hands-On BASIC Workbook For Kids Using The Commodore 64* by Jane G. Reh, published by Brady Communications Company, Inc. The book guides the beginner from the first step of computer usage—learning the Commodore 64 keyboard—through the step-by-step process of learning and using BASIC programming. Before this chapter begins, the reader has experienced a guided hands-on keyboard tour and has learned to use character string, math and combined PRINT commands. This article does not contain the book illustrations or the chapter-end programming activities.

HANDS-ON in this article, as in the book, are keyboard instructions printed in capital letters. Do all of the hands-on work on your Commodore 64.

## Beginning Programming

Our journey into the land of computers is going very quickly. You have arrived at "Beginning Programming" already!

## Congratulations!

In the last three chapters, we have been using PRINT commands. Commands are performed by the computer in the Immediate Mode. This means that each command is performed by the computer *immediately* after you press the RETURN key. In this chapter, you will begin to use the Program Mode. You will give the computer one or more instructions, pressing the RETURN key after each one and the computer will store each of them in its memory. In the program mode, these instructions are called statements. One or more statements become a computer program.

A PRINT command becomes a PRINT statement when it is preceded by a statement number. This is very easy to do. You type a statement number followed by a PRINT command and the PRINT command becomes a PRINT statement. The statement number is assigned by **you,** the programmer. It can be any number between zero and 63999. (Remember, we never use commas in numbers given to the computer.)

*In the program mode, you give the computer one or more instructions, pressing the RETURN key after each one and the computer stores each of them in its memory.*

Statements are easy to understand through a HANDS-ON example. First, we will do a PRINT command just as you have already done. Then we will change this command to a PRINT statement. You should use your own name—in the command and in the statement below—in place of BILL REH. (*Remember:* If you make an error, just retype the line, including the statement number and press the RETURN key.) Clear your screen.

**TYPE** PRINT "MY NAME IS BILL REH."
**PRESS** the RETURN key.
**TYPE** 10 PRINT "MY NAME IS BILL REH."
**PRESS** the RETURN key.

In all of the screen illustrations in this chapter, your screen statements will differ from mine—because you are using your character strings instead of mine. My screen looks like this:

```
PRINT "MY NAME IS BILL REH."
MY NAME IS BILL REH.
READY
10 PRINT "MY NAME IS BILL REH."
```

Your computer printed the character string in your PRINT command as soon as you pressed the RETURN key. The computer has not done anything at all with the character string of your PRINT statement! The PRINT statement is stored in your computer's memory. You can't see it, but I can prove it! Clear your screen. Now your PRINT command is gone forever. **But** we can get your PRINT statement back because it is stored in computer memory.

First, you will learn two more commands: LIST and RUN.

LIST asks the computer to show you the program it has in memory.

**TYPE** LIST
**PRESS** the RETURN key.

There it is on your screen—your one-statement program! See, it really was stored in your computer's memory.

Your program (whether one or many statements long) will never be executed (RUN) unless you ask the computer to RUN it. RUN tells the computer to execute each statement of the program that is in computer memory.

**TYPE** RUN
**PRESS** the RETURN key.

Now the computer printed your one-line program—the character string of your PRINT statement. My screen looks like this:

```
LIST
10 PRINT "MY NAME IS BILL
   REH."
READY.
RUN
MY NAME IS BILL REH.
READY.
```

You may be wondering why we would want to use a PRINT statement instead of a PRINT command, when it's more work and we get the same thing. That's a good and fair question. The answer is that a programmer would use the command to simply print one character string, not a program statement. Programs are rarely just one statement—they are many statements. A computer program is a list of things that the computer should do. Some programs are thousands of statements long!

The computer software that you have already bought or will buy, is nothing more than computer programs. Each one is written to perform a certain task. It can be a game program to amuse you or an educational program to teach you. A program can be on a cartridge, disk, tape, or typed in on the keyboard.

We will be adding to this one-line program throughout this chapter. So, it is important that you leave your computer on until the chapter is finished. When the computer is turned off, everything is erased from computer memory! If your computer is turned off, your program will be gone and you will have to type in each statement again to continue the chapter.

Now let's make your first computer program more real by adding to it. We will use statement numbers that increase by ten for each additional statement. This will leave you nine free statement numbers in case you want to add statements at a later time. (This will become clearer later in this chapter.) Our second PRINT statement, number 20, will be your address—replacing my fictitious one.

**TYPE** 20 PRINT "I LIVE AT 1 MAIN STREET, COMPUTERLAND, PA."
**PRESS** the RETURN key.
**TYPE** RUN
**PRESS** the RETURN key.

Now you see both lines of your program printed—your name on the first line and your address on the second line. The whole program was RUN. My screen looks like this:

```
LIST
10 PRINT "MY NAME IS BILL
  REH."
READY.
RUN
MY NAME IS BILL REH.
READY.
20 PRINT "I LIVE AT
  1 MAIN STREET, COMPU
  TERLAND, PA."
RUN
MY NAME IS BILL REH.
I LIVE AT 1 MAIN STREET,
  COMPUTERLAND, P
  A.
READY.
```

Now let's LIST our program.

**TYPE** LIST
**PRESS** the RETURN key.

*The computer executes each statement in statement number order, from the lowest number to the highest number.*

Sure enough, everything is there!

Now let's add two more program statements, numbers 30 and 40, to the program. Use **your** school's name and **your** grade in the statements below.

**TYPE** 30 PRINT "I ATTEND COMPUTER ELEMENTARY SCHOOL."
**PRESS** the RETURN key.
**TYPE** 40 PRINT "I AM IN THE FIFTH GRADE."
**PRESS** the RETURN key.

Clear your screen and LIST your program. You will see that the computer has added statements 30 and 40 to your program. Now RUN your program. All four statement lines—10, 20, 30, and 40—were executed. (If you forgot how to use either of the commands LIST or RUN, look back in this chapter.)

Let's make our program look really good on the screen! Wouldn't it be nice to be able to RUN our program on an empty screen? We can clear the screen and then type RUN, but we'll still have the command word RUN on the screen with the program. Let's try it and see.

**PRESS** the SHIFT and CLR/HOME keys.
**TYPE** RUN
**PRESS** the RETURN key.

Sure enough, the command word RUN is on the top of the screen. Let's use a better way to clear the screen for our program. We can use the CLR/HOME key in a PRINT statement in our program! If we do that as our first statement, the computer will clear the screen and send the cursor home before it executes any other statement. The computer executes each statement in statement number order—*from the lowest number to the highest number.* You must be careful to number your statements—in the order that you want the computer to perform them.

When you hold down the SHIFT key and press the CLR/HOME key, after typing the beginning quote, it will print a special symbol—a heart inside a square. You will then type another quote following the symbol. In the HANDS-ON work, you will **not** type the letters "CLR/HOME." You will hold down the SHIFT key and press the CLR/HOME key whenever you see SHIFT—CLR/HOME in a program statement.

**TYPE** 5 PRINT "SHIFT—CLR/HOME"

Be sure that you typed a quote *before and after* pressing SHIFT and CLR/HOME.

**PRESS** the RETURN key.
RUN your program.
My screen looks like this:

```
MY NAME IS BILL REH.
I LIVE AT 1 MAIN
  STREET, COMPUTERLAND, P
  A.
I ATTEND COMPUTER
  ELEMENTARY SCHOOL.
I AM IN THE FIFTH GRADE.
READY.
```

Now we have added a statement to the beginning of the program, as well as adding statements to the end of our program! Do you know why I didn't use the number zero as the statement number of our first PRINT statement? If we had, we would not have been able to put the clear screen statement first, since we can't use a statement number lower than zero.

We can also *replace* a statement line in a program. For example, if we decided that we didn't want statement 40 to print our grade in school, we could change it to something else, by replacing it with another statement numbered 40. That's why we can't use the same statement number more than once! The new statement simply replaces the old statement. Let's try one now. Use your favorite school subject where I have SCIENCE.

**TYPE** 40 PRINT "MY FAVORITE SUBJECT IS SCIENCE."
**PRESS** the RETURN key.
RUN your program.

You have replaced the print line telling your grade in school with a print line telling your favorite school subject.

Next, we'll add a statement *between* two of our program statements. LIST your program. I want you to add a statement to print your nickname between the statement that prints your name (statement number 10) and the statement that prints your address (statement number 20). We can use any number from 11 through 19. We'll use the number in the middle, number 15. Use **your** nickname in place of BILLY.

**TYPE** 15 PRINT "MY NICKNAME IS BILLY."
**PRESS** the RETURN key.
RUN your program.
Now LIST your program.

By using 15 as our statement number, we still have four free numbers (11,12,13,14) between statement number 10 and statement number 15. Likewise, we still have four free numbers between statement number 15 and statement number 20—16, 17, 18 and 19. So we can still add statements either before statement 15 or after statement 15. If we had used statement number 11, instead of statement number 15, we would not be able to add another statement between our name and our nickname. If we had used statement 19, instead of statement number 15, we would no longer be able to add a statement between our nickname and our address. This is why all good programmers leave unused numbers between their statements.

*Programmers leave unused numbers between their statements, in case they need to add more statement lines later.*

We will add just one more statement line to our program—the END statement.

**TYPE** 50 END
**PRESS** the RETURN key.

END means just what it says—THE END, STOP! It tells the computer that this is the END of the program. The END statement is not required by your Commodore computer. However, in some programs it is necessary. So we will use the END statement throughout this book. You will understand why it can be important when you have learned more programming.

We have added many statement lines to our program. Now let's *remove* a statement. You will be surprised at how easy this is to do. Maybe you would rather not have your nickname in your program. So—let's take it out. The statement that prints your nickname is statement number 15. Clear your screen and LIST your program.

**TYPE** 15
**PRESS** the RETURN key.

Statement number 15 is gone! We remove a statement from a computer program by typing the statement number and pressing the RETURN key. That's all!

LIST your program again. See—statement number 15, your nickname, is gone. Now RUN your program. No more nickname! Of course, you can type statement number 15 again to put it back in.

My screen looks like this:

```
MY NAME IS BILL REH.
I LIVE AT 1 MAIN STREET,
  COMPUTERLAND, P
  A.
I ATTEND COMPUTER
  ELEMENTARY SCHOOL.
MY FAVORITE SUBJECT IS
  SCIENCE.
READY.
```

Now that you have begun programming, you may want to SAVE your programs on tape or disk. If you already have a Commodore cassette recorder or disk drive, you will want to do this. All you need is a blank cassette tape or blank disk. Before trying to SAVE your first program, read about it in the *Commodore 64 User's Guide* that came with your computer. To later LOAD your program back into computer memory, also refer to your *Commodore 64 User's Guide*. Remember, when you load a program into memory, it first clears any program that was already there! If you want to keep the program in memory, SAVE it before loading another program. (Read pages 18 through 22 of your *User's Guide*.)

If you would like to SAVE the program in memory, do it now!

Before you can begin writing (called coding by programmers) and running your own programs, you have one more command to learn. Are you ready to learn a NEW command? NEW tells the computer to erase memory. Be careful when using NEW. Once your program is gone, there is no remedy except to type it in all over again (unless you already saved it on tape or disk). It is a good practice to always use LIST before you use NEW, to be sure that you want to erase the program in computer memory.

If you're ready to erase your program from memory.

**TYPE** NEW
**PRESS** the RETURN key.

Now try to LIST and RUN your program. See—it's gone!

Remember, only one program can be in computer memory at one time. If you do not clear memory (use the NEW command or turn off the computer) and you enter another program, you might have part of your old program as part of your new program!

**Let's see how this could happen!**

Pretend that we have just turned on our computers. This means that computer memory is clear. (Actually, we just used the NEW command to clear memory.) Now we'll enter a program. What exactly does enter a program mean? Enter a program means to press the RETURN key after typing each statement line. And remember that RUN the program means to type the command RUN and press the RETURN key. From now on I will assume that you know what both of these terms mean—enter the program and RUN the program.

Enter the program:

```
TYPE 10 PRINT "SHIFT—
       CLR/HOME"
     20 PRINT "LET'S
       PROGRAM"
     30 PRINT "ON THE
       COMMODORE 64"
     40 END
```

RUN the program.

We decide to add a statement to

our program. Enter the following statement.

**TYPE** 35 PRINT "BECAUSE IT'S FUN"

LIST the program. (Type LIST and press RETURN.) The program should contain statements 10, 20, 35 and 40.

RUN the program.

We chat with friends for a few minutes while we decide what our next program will be. (And we forget to clear computer memory!)

Now for our next program. (Remember, **TYPE** means to type and enter each statement line.)

```
TYPE 10 PRINT "SHIFT—
       CLR/HOME"
     20 PRINT 42*4
     30 PRINT 66*3
     50 PRINT 39*6
     60 END
```

*Note*: I deliberately skipped from statement number 30 to statement number 50.

RUN the program.

We know that something is wrong!

Our screen output is:

```
168
198
BECAUSE IT'S FUN
READY.
```

LIST the program and we'll figure out what happened.

Here's our *first program*:

```
10 PRINT "SHIFT—CLR/HOME"
20 PRINT "LET'S PROGRAM"
30 PRINT "ON THE COMMODORE
   64"
35 PRINT "BECAUSE IT'S FUN"
40 END
```

Here's our *second program:*

```
10 PRINT "SHIFT—CLR/HOME"
20 PRINT 42*4
30 PRINT 39*3
50 PRINT 39*6
60 END
```

Now we'll be detectives! Let's see what the computer did.

Remember, we *replace* a program statement by using the same statement number for another statement. Statements 10, 20 and 30 of our second program replaced statements 10, 20 and 30 of our first program!

Since we do not have statement numbers 35 or 40 in our second program, these statements were not replaced. They remain in computer memory from our first program (which was never erased).

***When you sit down at a computer, the first thing you should do is type LIST, so you'll know if there is a program already in memory.***

Statement numbers 50 and 60 of our second program are also in computer memory. But we need to know why these statements weren't executed (performed) in our program RUN. To help you to see why, we'll remove statement number 10 (the SHIFT-CLR/HOME statement) so that we will be able to LIST the program, RUN the program again and have both the program listing and the program output on the screen at the same time.

**TYPE** 10

Now statement number 10 is erased from computer memory.

Clear the screen (hold down the SHIFT key and press the CLR/HOME key).

LIST the program.

RUN the program.

Both our program listing and our program output are on the screen. We can see from the program output that the computer executed statements 20, 30 and 35. The computer also executed statement number 40—END! The computer did exactly what we told it to do. It stopped after reading END. The computer cannot do statements 50 and 60 unless we remove statement number 40.

We'll remove statement numbers 35 and 40 because they don't belong in this program. They're just left over from our first program.

**TYPE** 35
40

LIST the program.

RUN the program.

Now our second program runs correctly. We are only missing statement number 10, the CLR/HOME statement. You may re-enter this statement if you wish.

The moral of this lesson is:

1. When you sit down at a computer, the first thing you should do is type LIST, unless you have just turned the computer on. This way you'll know if there is a program already in computer memory. Remember, someone else may have been using the computer before you sat down.
2. When you are finished using a program (SAVEd it or don't want it), use the NEW command to clear computer memory.

If you always follow these rules, you won't end up with a scrambled program—some of one program and some of another program.

Clear computer memory (type NEW and press the RETURN key).

Clear the screen (hold down the SHIFT key and press the CLR/HOME key).

To help you to remember this beginning programming, here is a short review.

## Review

Three important things to remember about statement numbers are:

1. A statement number tells the computer not to perform the statement immediately, but to store it in memory when you press the RETURN key.
2. The statement numbers establish the order in which the statements will be done. The lowest numbered statement is performed first, then the next highest numbered statement, until the last and highest numbered statement is performed.
3. The END statement is always the last statement performed.

Our three new commands are:

LIST— asks the computer to show us (on the screen) the program it has in its memory.

RUN— tells the computer to execute the program, statement by statement, that is in its memory.

NEW— tells the computer to erase the program that is in its memory. C

BY DAVID MALMBERG

# Tiny FORTH in LOGO

*Using the LOGO language available for your Commodore 64, you can create and use yet **another** programming language known as FORTH.*

Here is a small version of the FORTH computer language written in the LOGO language for the Commodore 64. Normally, one high-level language is not written in another. The results, among other things, are slower and less elegant than they could be. There are two reasons to explore a FORTH written in LOGO here: (1) to learn about and to play with FORTH before investing in a complete FORTH system and (2) to see an example of how LOGO's list processing and artificial intelligence capabilities can be used for language translation—in this case, translation from one computer language to another computer language.

## The Flavor of FORTH

The FORTH language was created in the 1960's by Charles Moore and was originally used for process-control applications (such as controlling a radio telescope) using large IBM computers. Today, FORTH is used for every type of application from complex business systems to mind-boggling video games. Versions of FORTH are available for almost every computer.

FORTH has some significant advantages over BASIC. It is almost always a compiled language, so finished programs run ten to 200 times faster than a similar program written in BASIC. FORTH produces very compact code so it is possible to put a very complex program in only a small amount of memory. The language is highly "portable"—meaning a FORTH program written for one computer can be run on many other computers with few (if any) changes. These three features (speed, compactness and portability) make FORTH a favorite language for professional software developers who write packages that will be used on a wide variety of microcomputers.

FORTH is a very unusual language. The biggest difference between it and other languages is the use of *reverse Polish notation* to specify the order of mathematical operations. In reverse Polish notation, or RPN, the operations are written after their arguments, not between them. For example, "5-3" would be expressed as "5 3 -". No parentheses are used in RPN so "(A-B)/(C*D)" would be specified by "A B - C D * /" in FORTH. This notation is also used by most Hewlett-Packard calculators.

Another unique feature of the language is its *stack* architecture. In FORTH, all numerical values and parameters are communicated through the stack. For example, to divide two numbers, both numbers must be on the stack—and the answer will be returned to the stack. Most computer languages use stacks, but FORTH is unusual in letting the programming manipulate the stack so directly.

The best way to visualize a stack of numbers is to think of a stack of plates in your kitchen cupboard. You add and remove plates one at a time only at the top of the plate stack. Similarly, in FORTH you add numbers to or remove numbers from the stack only from the top. This is called a LIFO (last-in-first-out) stack. For example, in FORTH the expression "5 3 -" would first put the value of five on the top of the stack, then put three on top of the five so the five is now the second number on the stack. When FORTH sees the minus sign, it subtracts the top element of the stack from the second element and replaces both numbers on the stack by the answer, which is two.

The basic building block of the FORTH language is a *word*. A word is a sequence of characters that causes a procedure to be executed. These characters need not be letters. For instance, in FORTH the "+" sign is a word that causes the top two numbers on the stack to be replaced by their sum. Each version of FORTH has its own built-in vocabulary of words. Each of these words will make one specific thing happen. Entering the command VLIST (another word) will cause all of the words in your FORTH's vocabulary to be displayed.

Table 1 gives the list of words that are available in the version of FORTH implemented in the LOGO listing at the end of this article. The table also shows the stack before and after each word is executed and gives a brief description of what actions are caused by each word.

## Defining New Words

Like LOGO, but unlike BASIC, FORTH is an *extensible* language. This means that the programmer can extend the vocabulary of the language by creating new words. In FORTH this is done through what is called a "colon" definition. For example, to define a new word that would replace the number on the top of the stack by its square, you would enter:

```
: SQUARE DUP * ;
```

followed by a return. The colon at the beginning and the semicolon at the end set the boundaries of the new word SQUARE. Once defined, whenever FORTH encounters the word SQUARE, it will perform the words between the name SQUARE in the definition and the ending semicolon. That is, it will perform (1) DUP which duplicates another copy of the top element of the stack, and (2) asterisk, which multiplies the two top elements together and replaces them with the answer. For example, if you enter "5 SQUARE ." followed by a

RETURN, the computer will print 25. The period mark (pronounced "dot" by FORTHers) is a FORTH word that causes the top value to be printed then dropped from the stack.

New word definitions may use other new words. Thus, you could define a new word to CUBE the value on the top of the stack as:

: CUBE DUP SQUARE * ;

followed by a RETURN. Then entering "5 CUBE ." followed by a RETURN will cause 125 to be printed.

## Some Control Words

In BASIC, the order in which statements are executed is determined by FOR...NEXT, GOTO, ON x GOTO, GOSUB, ON x GOSUB and IF...THEN statements. These are called control statements because they control the flow of the program. FORTH's control words are both similar to and different from their BASIC counterparts. First, FORTH is a "structured" language so it does not have a word that is equivalent to a BASIC GOTO. A GOSUB is accomplished by simply naming the word (subroutine) you wish to execute, such as the name SQUARE within the definition of CUBE.

FORTH's looping structure is very similar to BASIC's use of FOR and NEXT, only in FORTH the words are DO and LOOP. For example, to print the numbers from one to ten, you could define the following word:

: COUNT-TO-10 11 1 DO I . LOOP ;

Then when you entered "COUNT-TO-10" followed by a return, the word would be executed and the numbers from one to ten printed.

When FORTH encounters the word DO, it sets up an index (just like BASIC) which starts with the top number on the stack (one, in the above example) and is incremented by one each time through the loop until it is one less than the second number on the stack. In the above example, this second number is 11 so the loop will end after ten iterations. After all iterations have been completed, control passes to whatever word follows the word LOOP (if any) and the starting and ending limits of the loop will have been dropped from the stack. The word "I" causes the current index to be put on the top of the stack.

A couple more examples of DO-LOOPs may be helpful. To replace the top of the stack by its factorial you could define the following word:

: FACTORIAL 1 SWAP 1 + 1 DO I * LOOP ;

A factorial of a number n is the product of n, n-1, n-2 , . . . , 2, 1. For example, 5 factorial is 5*4*3*2*1 or 120. Once FACTORIAL is defined in FORTH, entering "5 FACTORIAL ." followed by a RETURN will cause 120 to be printed. The only new word in the above definition is SWAP which causes the first and second elements of the stack to be exchanged.

DO-LOOPs may be "nested" within FORTH. For example, by defining the following three new words, you can print a multiplication table up to ten times ten:

: ROW CR 11 1 DO DUP I * . LOOP DROP ; (RETURN)

: MORE-ROWS CR 11 1 DO I ROW LOOP ; (RETURN)

: TABLE CR . " MULTIPLICATION TABLE " MORE-ROWS ; (RETURN)

Notice that because MORE-ROWS calls ROW, the two loops are nested, i.e., ROW's DO-LOOP is contained within MORE-ROWS' loop.

The above example contains several new FORTH words. CR causes a carriage return. DROP causes the top value on the stack to be dropped. Period-quote mark causes all of the characters between it and the second quote mark to be printed—in this case, the title "MULTIPLICATION TABLE."

*FORTH has some significant advantages over BASIC. Programs run ten to 200 times faster, very complex programs fit into a small amount of memory, and programs written for one computer can be run on many other computers with few (if any) changes.*

Like BASIC, FORTH has an IF...THEN structure. However, its syntax is different. If you define:

: TEST-IF IF ." TRUE PART " THEN ." COMMON PART " ;

followed by a RETURN, you can see its syntax. When FORTH encounters the word IF, it tests the top of the stack as a "truth flag." If the flag is true (equal to one), all of the words between IF and THEN are executed. If the flag is false (equal to zero), control jumps to the word following THEN. After the flag is tested, it is dropped so it is no longer on the top of the stack. For example, entering "1 TEST-IF" followed by a RETURN will print "TRUE PART COMMON PART," whereas entering "0 TEST-IF" (RETURN) will print only "COMMON PART."

FORTH also has another form of the IF structure as illustrated by:

:TEST-IF-ELSE IF ." TRUE PART " ELSE ." FALSE PART " THEN . "COMMON PART ";

Using this form if the truth flag is false, the words between ELSE and THEN are executed. For example, entering "0 TEST-IF-ELSE" (RETURN) will print "FALSE PART COMMON PART."

FORTH has a number of comparison words that allow you to set the truth flag based on various conditions. A few examples. The "=" sets the flag to true if the top two elements are equal, and to false otherwise. The ">" sets the flag to true if the second element is greater than the top element, and to false otherwise. Conversely, "<" sets the flag to true if the second element is less than the top element, and to false otherwise. The "0" sets the flag to true if the number on the top of the stack is zero. These and other comparison words always destroy (by dropping from the stack) the numbers they test and replace those numbers with the flag. If you need a number after the test, be sure to DUP it *before* performing the comparison.

## Learning More About FORTH

The above discussion and examples are meant to give you a flavor of FORTH and to whet your appetite for more. It is by no means a comprehen-

sive description of the words or the language syntax. To learn more about FORTH and to have some fun exploring its capabilities, load your LOGO system and key in the LOGO program in the listing. Type "TINY.FORTH" to start the program. Your Commodore 64 will be transformed into a FORTH system. Try writing some simple FORTH programs using the full range of words available. (See Table 1.) A specific program you may wish to try is to develop a new word, POWER, which will replace the top two values on the stack by a value that is the second number raised to the integer power of the top number. Hint: use the word OVER and a structure similar to FACTORIAL.

The version of FORTH implemented by the LOGO listing has most of the functions found in a complete FORTH. It has variables, all of the standard control words, the ability to add new words to the language, and the ability to "nest" control words (as long as they are in different colon definitions). It even has full floating-point calculations instead of the integer arithmetic of standard FORTH. Unfortunately, the LOGO version does not have FORTH's typical speed. However, it is fast enough to be an effective and fun learning tool.

A few words of advice on keying in the LOGO listing are in order. This is a rather large program by normal LOGO standards. To conserve memory, save a copy of the program on disk before you start trying out the program. Then, as you make your corrections of typos, etc., make your changes to the version on the disk and then resave the new corrected version before further testing. Following this procedure will ensure your final copy will use the least memory possible and will allow you to write quite large FORTH programs.

If, after experimenting, you find that you enjoy FORTH and would like to learn more about it, there are several excellent books that can help you. *FORTH Programming*, by Leo J. Scanlon (Howard W. Sams, 1982) and *Starting FORTH*, by Leo Brodie (Prentice Hall, 1981) are both highly recommended.

## The LOGO Version of FORTH

For the sophisticated LOGOphile, let's now consider the article's second objective: seeing how LOGO's list-processing and artificial-intelligence capabilities can be used to translate one computer language into another. First, the FORTH stack is simulated using a LOGO list named, aptly, STACK. The PUSH :NUMBER routine will place its input on top of the stack (actually the end of the list) and the POP routine will output and drop the top (actually last) element.

*In reverse Polish notation (RPN), the operations are written after their arguments, not between them. So "5–3" would be expressed "5 3 –".*

Standard FORTH uses another stack called the "return stack" to keep track of DO-LOOP indices and the level of nesting. In the LOGO version, another list named INDEX is used for the same purpose. Whenever the program encounters the word DO, it adds the top two values on the stack to the end of the INDEX list. This is done in the LOGO procedure DO.PROCESS. Then, when the program encounters the word LOOP, it increments the current loop index (the last element of INDEX) and tests if it is equal to the limit of the loop (the next-to-last element of INDEX). If the current loop index is equal to the limit, control passes to the word following LOOP; otherwise control will jump to the word just after the previous DO so the loop can be repeated.

*Like LOGO, FORTH is an extensible language. That means the programmer can extend the vocabulary of the language.*

The DEFINE.CODE routine handles a colon definition of a new FORTH word by creating a new LOGO list with the proper name that contains the words within the definition. For example, if you entered ": SQUARE DUP * ;" the DEFINE.CODE routine would create a new list named SQUARE that would contain two elements, DUP and asterisk. DEFINE.CODE would also add the new word's name (i.e., SQUARE) to a list of words that have been defined called DEFINITIONS. Thereafter, whenever the program encounters a word that is not part of its standard FORTH vocabulary, it will check if that name is an element of the DEFINITIONS list. If it is, the program will know that the word (SQUARE) is a newly defined word and it will execute the FORTH words contained in the list with that word's name (i.e., DUP and asterisk).

The DEFINE.VAR procedure creates new FORTH variables in a similar fashion to DEFINE.CODE's creation of new FORTH words. For example, if you entered "3 VARIABLE JEFF," DEFINE.VAR would create a new variable named JEFF with an initial value of three. Later in your FORTH program, you could "fetch" the current value of JEFF and put it on the top of the stack by using the FORTH command "JEFF@" or assign (called "store" by FORTHers) the current top of the stack to JEFF by the command "JEFF !". Both the fetch and store activities are handled in the LOGO procedure VAR.PROCESS.

When you run TINY.FORTH, you will get a brief title section and the prompt symbol made up of two greater-than signs. At this point, you are in the input procedure and the program is awaiting your entry of FORTH code or commands. Whatever you enter will be assigned to a list LINE.IN and then the DO.LIST procedure will be called with two inputs: the list LINE.IN and a pointer that points to the first word in that list. DO.LIST will then call DO.WORD repeatedly for each FORTH word in LINE.IN, incrementing the pointer each time until the last word in the list has been reached. After all words have been processed, INPUT calls itself recursively and the prompt symbol is printed again and the program

awaits further FORTH input.

DO.WORD is clearly the heart of the program. This procedure takes whatever FORTH word is being pointed to in its current list and processes that word by simulating a FORTH system. For example, if the word is a number, DO.WORD pushes that number onto the top of the stack. If the word is an arithmetic operator the appropriate calculation is performed and the answer pushed onto the stack. If the word is a comparison word such as "0=," the test is made and the truth flag is pushed on the stack, etc. Similarly, control words such as DO, LOOP, IF, REPEAT, WHILE, and so on, are all processed to duplicate their behavior in FORTH.

If the word being pointed to is a newly defined FORTH word (i.e., it is an element of the list DEFINITIONS), DO.LIST is called with the list associated with that new word's name as input. For instance, when DO.LIST is processing the list named CUBE and it encounters the word SQUARE, DO.LIST will then be called again with the list of words in SQUARE as its input. Then when these SQUARE words are finished, DO.LIST will resume processing CUBE with the next word following the word SQUARE. LOGO's ability to make recursive calls to a procedure is one of the languages most powerful features. This capability makes the FORTH implementation relatively easy. C

*Program on pg. 108*

**Table 1. Tiny FORTH Words**

ARITHMETIC AND STACK MANIPULATION WORDS

| | | |
|---|---|---|
| + | (n2 n1 -- sum) | Adds two top numbers. |
| - | (n2 n1 -- diff) | Subtracts n1 from n2. |
| * | (n2 n1 -- prod) | Multiplies two top numbers. |
| / | (n2 n1 -- quot) | Divides n2 by n1. |
| DUP | (n -- n n) | Duplicates the top number. |
| DROP | (n -- ) | Discards top number. |
| SWAP | (n2 n1 -- n1 n2) | Exchanges top two numbers. |
| OVER | (n2 n1 -- n2 n1 n2) | Puts copy of second number on top. |

COMPARISON WORDS

| | | |
|---|---|---|
| > | (n2 n1 -- flag) | True if n2 greater than n1. |
| = | (n2 n1 -- flag) | True if top two numbers are equal. |
| < | (n2 n1 -- flag) | True if n2 less than n1. |
| 0> | (n -- flag) | True if top number is positive. |
| 0= | (n -- flag) | True if top number is zero. |
| 0< | (n -- flag) | True if top number is negative. |
| NOT | (flag1 -- flag2) | Reverses value of flag. |
| MIN | (n2 n1 -- min) | Leaves lesser of two top numbers. |
| MAX | (n2 n1 -- max) | Leaves greater of two top numbers. |
| ABS | (n -- absolute) | Gives absolute value of top value. |

VARIABLE MANIPULATION WORDS

| | | |
|---|---|---|
| VARIABLE xxx | (n -- ) | Creates a variable named xxx with an initial value equal to the top of the stack. |
| xxx @ | ( -- n) | Puts the current value of the variable xxx on top of the stack. "@" is pronounced "fetch." |
| xxx ! | (n -- ) | Sets the value of the variable xxx to the top of the stack. "!" is pronounced "store." |

CONTROL WORDS

| | | |
|---|---|---|
| DO...LOOP | (end+1 start --- ) | Performs loop given index range. See article. |
| I | ( -- index) | Puts current loop index on stack. |
| LEAVE | ( -- ) | Terminates loop at next LOOP. |
| IF...THEN | (flag -- ) | Executes words between IF and THEN if flag is true. See article. |
| IF...ELSE...THEN | (flag -- ) | Executes words between IF and ELSE if flag is true and words between ELSE and THEN if flag is false. |

```
BEGIN...UNTIL              (flag -- )      Loops back to BEGIN until flag
                                           tested at UNTIL is true.
BEGIN...WHILE...REPEAT     (flag -- )      Tests flag at WHILE and jumps past
                                           REPEAT if false.  REPEAT causes
                                           unconditional jump to BEGIN.

OTHER WORDS

VLIST                      ( -- )          Prints a vocabulary list of all
                                           currently defined FORTH words.
.                          (n -- )         Prints top of stack.  Pronounced
                                           "dot."
."                         ( -- )          Prints message until " mark.
                                           Pronounced "dot-quote."
: xxx ... ;                ( -- )          Defines new FORTH word named xxx.
                                           See article for examples.
LIST                       ( -- )          Prints definitions of all new
                                           FORTH words.
FORGET xxx                 ( -- )          Erases the current definition of
                                           the FORTH word xxx.
CR                         ( -- )          Prints a carriage return.
ABORT                      ( -- )          Clears stack and DO-LOOP indices.
COLD                       ( -- )          Forgets all new FORTH words and
                                           restarts TINY.FORTH from scratch.
```

```
TO TINY.FORTH
   TITLE
   SETUP
   INPUT
END

TO TITLE
   CLEARTEXT
   CURSOR 6 1 PRINT [TINY FORTH WRITTEN IN LOGO]
   CURSOR 11 3 PRINT [BY DAVID MALMBERG]
   CURSOR 2 5 PRINT [TYPE VLIST TO GET FORTH VOCABULARY]
   PRINT []
END

TO SETUP
   MAKE "STACK []
   MAKE "DEFINITIONS []
   MAKE "VARIABLES []
   MAKE "INDEX []
   MAKE "VOCAB [+ - * / = > < 0= 0< 0> NOT CR . ." DROP DO LOOP I LEAVE
       BEGIN UNTIL WHILE REPEAT DUP SWAP ABORT COLD MIN MAX ABS LIST @ !
       VARIABLE : ; VLIST IF THEN ELSE FORGET OVER]
END

TO INPUT
   .GCOLL
   PRINT []
   PRINT1 [>>] MAKE "LINE.IN REQUEST
   MAKE "PTR 1
   DO.LIST :PTR :LINE.IN
   INPUT
END

TO DO.LIST :PTR1 :LIST2
   IF :PTR1 = 1 + COUNT :LIST2 STOP
   DO.WORD :PTR1 :LIST2
   DO.LIST ( :PTR1 + 1 ) :LIST2
END
```

```
TO DO.WORD :POINTER :LIST
   MAKE "W ITEM :POINTER :LIST
   IF :W = [] STOP
   IF NUMBER? :W PUSH :W STOP
   IF :W = "+ PUSH ( POP + POP ) STOP
   IF :W = "- PUSH ( - POP + POP ) STOP
   IF :W = "* PUSH ( POP * POP ) STOP
   IF :W = "/ PUSH 1 / ( POP / POP ) STOP
   IF :W = ". MAKE "X POP ( PRINT1 :X "' ' ) STOP
   IF :W = "CR PRINT [] STOP
   IF :W = "DROP MAKE "X POP STOP
   IF :W = "DUP MAKE "X POP PUSH :X PUSH :X STOP
   IF :W = "I PUSH LAST :INDEX STOP
   IF :W = "SWAP MAKE "X POP MAKE "Y POP PUSH :X PUSH :Y STOP
   IF :W = "OVER MAKE "X POP MAKE "Y POP PUSH Y PUSH :X PUSH :Y STOP
   IF :W = "ABORT MAKE "STACK [] MAKE "INDEX [] INPUT STOP
   IF :W = "COLD TINY.FORTH STOP
   IF :W = "VLIST PRINT [] PRINT :VOCAB STOP
   IF :W = "DO DO.PROCESS STOP
   IF ANYOF :W = "@ :W = "! ERROR 4 :W STOP
   IF :W = "= TRY.LOGIC 1 STOP
   IF :W = "> TRY.LOGIC 2 STOP
   IF :W = "< TRY.LOGIC 3 STOP
   IF :W = "MIN TRY.LOGIC 4 STOP
   IF :W = "MAX TRY.LOGIC 5 STOP
   IF :W = "0= TRY.LOGIC 6 STOP
   IF :W = "0> TRY.LOGIC 7 STOP
   IF :W = "0< TRY.LOGIC 8 STOP
   IF :W = "ABS TRY.LOGIC 9 STOP
   IF :W = "NOT TRY.LOGIC 6 STOP
   IF :W = "." PRINT.LIST STOP
   IF :W = "LIST PRINT [] LIST.DEFS 1 STOP
   IF :W = "IF IF.PROC STOP
   IF ANYOF :W = "THEN :W = "BEGIN STOP
   IF :W = "ELSE JUMP "THEN STOP
   IF :W = "UNTIL UTL.PROC STOP
   IF :W = "REPEAT JUMP "BEGIN STOP
   IF :W = "WHILE WHL.PROC STOP
   IF :W = "LEAVE EXIT STOP
   IF :W = "VARIABLE DEFINE.VAR STOP
   IF :W = "LOOP LOOP STOP
   IF :W = ": DEFINE.CODE  STOP
   IF :W = "FORGET XIT STOP
   IF MEMBER? :W :DEFINITIONS DO.LIST 1 THING :W STOP
   IF MEMBER? :W :VARIABLES VAR.PROCESS STOP
   ERROR 1 :W
END

TO PUSH :NUMBER
   MAKE "STACK LPUT :NUMBER :STACK
END

TO POP
   IF :STACK = [] ERROR 2 0
   MAKE "X9 LAST :STACK
   MAKE "STACK BUTLAST :STACK
   OUTPUT :X9
END

TO DO.PROCESS
   IF NOT MEMBER? "LOOP :LIST ERROR 5 0
   MAKE "IS POP MAKE "IE POP
   MAKE "INDEX LPUT :IE :INDEX
   MAKE "INDEX LPUT :IS :INDEX
END
```

```
TO ERROR :N :W
   PRINT []
   PRINT [TINY FORTH ERROR:]
   IF :N = 1 ( PRINT :W [HAS NOT BEEN DEFINED YET] )
   IF :N = 2 PRINT [TRIED TO POP AN EMPTY STACK]
   IF :N = 3 ( PRINT [EXPECTED @ OR ! AFTER VARIABLE] :W )
   IF :N = 4 ( PRINT [EXPECTED VARIABLE NAME BEFORE] :W )
   IF :N = 5 PRINT [DO WITHOUT ENDING LOOP]
   IF :N = 6 ( PRINT :W [MISSING FROM LINE:] ) PRINT :LIST
   IF :N = 7 PRINT [: WITHOUT ENDING ;]
   INPUT
END

TO TRY.LOGIC :Z
   MAKE "Z2 POP MAKE "ANS 0
   IF :Z < 6 MAKE "Z1 POP
   IF ALLOF :Z = 1 :Z1 = :Z2 MAKE "ANS 1
   IF ALLOF :Z = 2 :Z1 > :Z2 MAKE "ANS 1
   IF ALLOF :Z = 3 :Z1 < :Z2 MAKE "ANS 1
   IF :Z = 4 MAKE "ANS :Z1 IF :Z2 < :Z1 MAKE "ANS :Z2
   IF :Z = 5 MAKE "ANS :Z1 IF :Z2 > :Z1 MAKE "ANS :Z2
   IF ALLOF :Z = 6 :Z2 = 0 MAKE "ANS 1
   IF ALLOF :Z = 7 :Z2 > 0 MAKE "ANS 1
   IF ALLOF :Z = 8 :Z2 < 0 MAKE "ANS 1
   IF :Z = 9 MAKE "ANS :Z2 IF :Z2 < 0 MAKE "ANS ( - :Z2 )
   PUSH :ANS
END

TO PRINT.LIST
   MAKE "PTR.STUFF SUB.LIST ( :POINTER + 1 ) "" :LIST
   ( PRINT1 :PTR.STUFF [' '] )
   MAKE "PTR1 :LPTR
END

TO LIST.DEFS :DC
   IF :DEFINITIONS = [] PRINT [NO NEW FORTH WORDS DEFINED] STOP
   IF :DC > COUNT :DEFINTIONS PRINT [] STOP
   PRINT1 ITEM :DC :DEFINTIONS PRINT1 [': '] PRINT THING ITEM :DC :DEFINTIONS
   LIST.DEFS :DC + 1
END

TO IF.PROC
   MAKE "FLAG POP
   IF ALLOF :FLAG = 0 MEMBER? "ELSE :LIST JUMP "ELSE STOP
   IF :FLAG = 0 JUMP "THEN
END

TO JUMP :LOC
   IF NOT MEMBER? :LOC :LIST ERROR 6 :LOC
   SET.PTR 1 :LOC :LIST
   MAKE "PTR1 :NPTR
END

TO UTL.PROC
   IF NOT POP = 1 JUMP "BEGIN
END

TO WHL.PROC
   IF POP = 0 JUMP "REPEAT
END

TO EXIT
   MAKE "E LAST :INDEX
   MAKE "INDEX ( SENTENCE BUTLAST BUTLAST :INDEX :E + 1 :E )
END
```

```
TO DEFINE.VAR
   MAKE "NAME ITEM ( 1 + :POINTER ) :LIST
   PRINT []
   PRINT1 :NAME PRINT [' IS NOW DEFINED AS A VARIABLE']
   MAKE :NAME POP
   MAKE "VARIABLES LPUT :NAME :VARIABLES
   INC.PTR
END

TO LOOP
   MAKE "INDEX SENTENCE ( BUTLAST :INDEX ) ( 1 + LAST :INDEX )
   IF LAST :INDEX = LAST ( BUTLAST :INDEX )
       MAKE "INDEX BUTLAST BUTLAST :INDEX STOP
   JUMP "DO
END

TO DEFINE.CODE
   IF NOT MEMBER? "; :LIST ERROR 7 0
   MAKE "NAME ITEM ( :POINTER + 1 ) :LIST
   PRINT []
   PRINT1 :NAME PRINT [' IS NOW DEFINED AS A WORD']
   MAKE :NAME SUB.LIST ( :POINTER + 2 ) "; :LIST
   MAKE "DEFINITIONS LPUT :NAME :DEFINITIONS
   MAKE "VOCAB LPUT :NAME :VOCAB
   MAKE "PTR1 :LPTR
END

TO XIT
   MAKE "NAME ITEM ( 1 + :POINTER ) :LIST
   MAKE "DEFINTIONS DELETE :NAME :DEFINTIONS
   MAKE "VOCAB DELETE :NAME :VOCAB
   INC.PTR
END

TO VAR.PROCESS
   MAKE "NEXT ITEM ( 1 + :POINTER ) :LIST
   IF :NEXT = "@ PUSH THING :W INC.PTR STOP
   IF :NEXT = "! MAKE :W POP INC.PTR STOP
   ERROR 3 :W
END

TO INC.PTR
   MAKE "PTR1 1 + :POINTER
END

TO SUB.LIST :NTH :LASTWORD :LIST1
   MAKE "C.WORD ITEM :NTH :LIST1
   IF :C.WORD = :LASTWORD MAKE "LPTR :NTH OUTPUT []
   OUTPUT SENTENCE :C.WORD SUB.LIST ( :NTH + 1 ) :LASTWORD :LIST1
END

TO SET.PTR :KTH :FIND :LIST3
   IF ITEM :KTH :LIST3 = :FIND MAKE "NPTR :KTH STOP
   SET.PTR ( :KTH + 1 ) :FIND :LIST3
END

TO DELETE :EL :LI
   IF :LI = [] OUTPUT []
   TEST :EL = FIRST :LI
   IFTRUE OUTPUT DELETE :EL BUTFIRST :LI
   IFFALSE OUTPUT FPUT FIRST :LI DELETE :EL BUTFIRST :LI
END
```

BY LINDA LEE

# Brought to You by Sybex

*Dozens of books on the market claim to be the best for new computer users. To help you choose one that fits your abilities, we look at several published by Sybex Computer Books.*

## *The Easy Guide to Your Commodore 64*

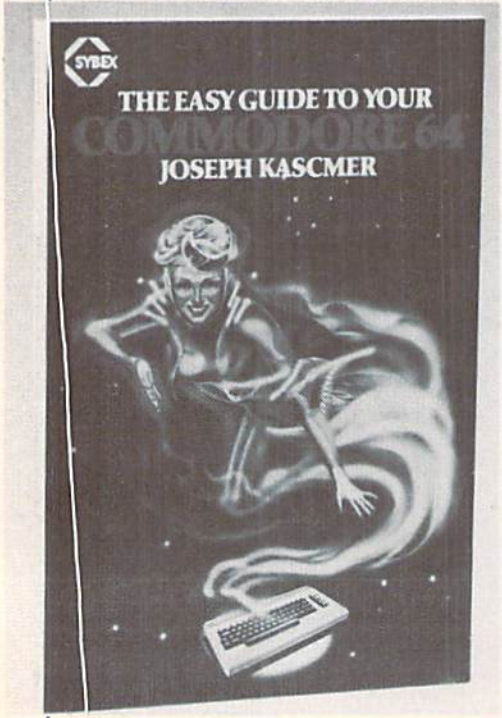
AUTHOR: JOSEPH KASCMER

Did you know that in computer jargon, back-up is not a direction given to a truck driver, hex is not a witch's curse and menu is not a selection of entrees at a restaurant? If these tidbits shock you, then join the ranks of novices behind a microcomputer.

Joseph Kascmer's tongue-in-cheek approach to learning the 64 begins with a chapter called "Coming Into Power." Master and Servant meet head-on with the introduction of hardware, cables and those strange, untypewriter-like keys such as cursor, CLEAR/HOME and INSERT/DELETE. Be careful with the reference to the C= key, this is really the Commodore logo key in disguise.

The "Video Printing" chapter shows how prose and poetry can be created on the screen just like a typewriter. Read between the lines, however, to find out that you don't use the RETURN key at any time. Cursor keys only, please.

The ever-faithful PRINT statement begins the list of BASIC commands. This works as a good lead into variables called "Stand-Ins for Numbers." Clear, concise descriptions move the reader from decision making with an IF statement through program control with the GOTO command. However, making patterns on the screen is not the strongest example of the REM, STOP or FOR/NEXT commands.




String variables are dealt with separately with easy-to-understand explanations of the left$, right$ and mid$. But where are the integer variables–%? Are they obsolete or just not valuable to a beginner?

A program that keeps track of plant growth is a down-to-earth approach to learning the ins and outs of DIM and READ statements. A few FOR/NEXT loops thrown in for good measure give the reader some practical applications. Again the descriptions are easy to follow. There is no feeling of being in over your head.

Economy or first class? The end results are the same. It's just a question of how you want to get there. This is the same with storage devices—economy style with a tape drive or first class with a disk drive. When making a decision, be sure you know exactly what your needs will be. For instance, the pros and cons of each device and the difference in file handling methods are examined to help make the choice easier.

Disk commands begin with loading the Test/Demo disk. Then the reader walks through the necessary steps for loading and saving programs.

Building and rebuilding programs clear up some points on GOSUB and GOTO routines. There is also insight on how to tailor existing programs to fit your needs.

The "Inside Story" covers PEEK and POKE statements. It explains enough without being too detailed, although the hex addresses could have been omitted. When dealing with hardware, a beginner can become confused with the mention of all the various cartridges and cards that can be used. Any information on what they are or where they can be obtained should have been included.

The Appendices at the back of the book list additional special commands, plus a "Jargon Phrase Guide." The low-key humor which flavors the entire book is especially tasteful here.

It's not a bad way to begin computing, just watch out for the bugs—and I'm not talking about the crawling six-legged ones.

## *The Commodore 64/VIC 20 Handbook*

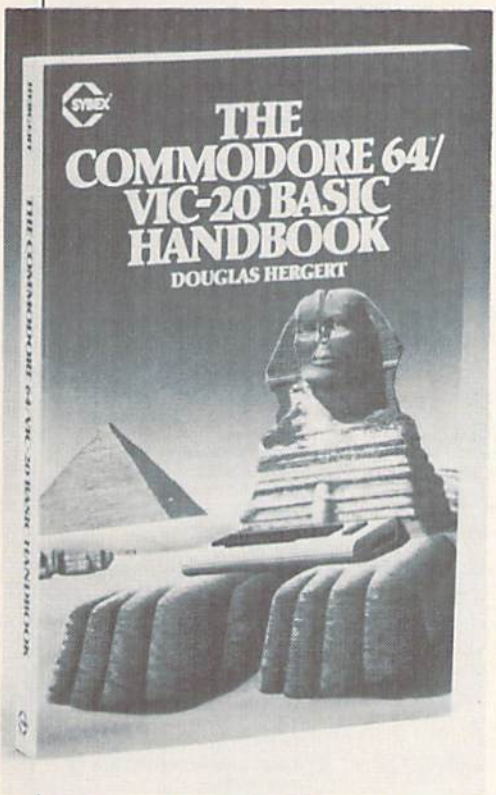
AUTHOR: DOUGLAS HERGERT

For more serious programmers, this handbook is definitely a plus. The programs are set up to run on either a VIC 20 or 64 and no PEEKs and POKEs are included. The sample screens are done on the VIC 20 so it is easier to follow. The alphabetical setup works great for reference, especially with key words at the top of every page.

Another bonus to this book is the distinction between types of computer terminology. For example, byte is computer vocabulary, GOTO is a command word, INT is a function and NOT is a logical operator. It also distinguishes between types of functions and command words: OPEN is an input/output command word and ST is an input/output function.

Next comes a sample program explanation which is simple to follow. Following that is the program listing followed by a sample screen of the output. Notes and comments end most entries.

The entire book is well organized




and easy to understand. Even the fact that an unnecessary LET command is used consistently throughout the book does not detract from its value.

Sample programs show examples that can be very useful later. The ASC function is demonstrated with a program that reads a character from the keyboard to print the ASCII value. The GOSUB command makes a meaningful tool for learning how to write a menu-driven program. Learning the GOTO command is helpful when balancing a checkbook, while INPUT# defines the salaried and hourly employees of a small business.

Have you ever altered an existing program just a little and when the program is run, all kinds of error messages appear mysteriously? Douglas Hergert goes as far as to tell you what possible errors may occur and why.

If you are unsure about arrays, the DIM statement contains an interpretation that even a beginner can understand. Well-defined examples clear up the fine points. The cross referencing also allows for quick, easy access to the necessary information. Arrays will lead you to DIM.

A review of this book would not be complete without mention of the cover. Unlike most computer books that get right to the heart of the matter directly from the cover, this handbook gives a sense of superiority. This cover features a pyramid in the background and a sphinx cradling a 64. This is an appealing introduction to a skillfully created reference guide.

### *Commodore 64 BASIC Programs in Minutes*

AUTHOR: STANLEY R. TROST

For a refreshing difference, there is a book that is not trying to teach you something. There are no detailed descriptions, no programming tips and no short routines to demonstrate a point. But there are over 65 short, easy-to-use BASIC programs and subroutines that do a myriad of tasks from calculations of present and future value of money to fraction multiplication. If you can read and type, you can make the most of this book.

The programs all work with a set of central subroutines found in Appendix A. There are eleven short subroutines (between four and 17 lines each) that must be typed in first and saved as one program. From there the choice is up to the reader.

The selections range from home to business finance programs. Especially useful business programs give you various types of depreciation, break-even points, sales prices, commissions and wages. A variety of mortgage programs, affordable house prices and rental property analysis programs can be found in the real estate section.

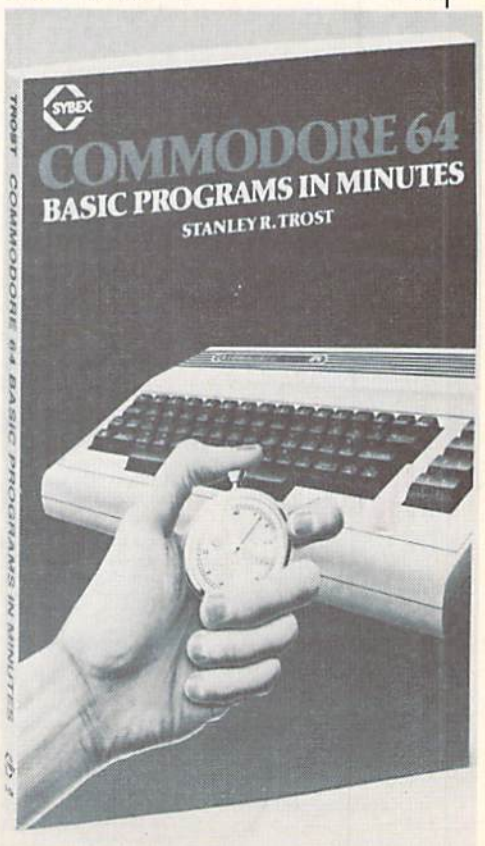
The nice feature of this book is the ability to build up to a larger program. Each chapter contains a series of small programs that build upon each other, each ranging in length from ten to 20 lines. Once the series is completed, a menu program is set up to give the user the advantage of selecting a specific area with each section. An entire chapter of programs is saved as one program, which is a unique approach for busy people who don't have hours to sit and type long, complicated programs to do fundamental tasks or don't want to buy expensive software packages that have many more features than are needed.

The data analysis programs allow you to calculate mean and standard deviation, weighted moving average and even linear regression. An entire chapter is also dedicated to file and record handling. It allows you to add and delete records, search records and save the file.

A sample screen output is displayed with every program, so you know exactly what should be happening. With subroutine handling, details like saving and loading files, asking for another run and listing the menu, the user can relax, obey screen commands and leave the worry of why the program works to Mr. Trost. For anyone interested in knowing how the subroutines work, Appendix B goes into brief explanations.

This book is not completely dedicated to adults, however. There is a series of mathematics practice programs which will aid children from elementary through high school. Starting with addition, subtraction, multiplication and division, the difficulty level increases when these functions are applied to fractions.

This is definitely not a book on everything you ever wanted to know about BASIC but forgot to ask. It is, however, a book that allows nonprogrammers to make good use of their equipment without a lot of frustration and expense. C



# USER GROUPS

**Because our user group listing has become excessively long, we are now publishing only a partial list in each issue. This time we've included all our user groups in states beginning with letters N through W and all foreign groups. Next issue we'll publish all the groups in states beginning with letters A through M. Then the following issue, it's back to N through W, and so on, until we get so many that we have to publish it in three—or four—or more—parts.**

### NEBRASKA

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Fremont, NE 68025
Kent Tegels

Platte Valley Commodore User Group (PVCUG)
1720 - O - St.
Gering, NE 69341
Jim Parks
(308) 436-3211

Greater Omaha Commodore 64 Users Group
2932 Leawood Dr.
Omaha, NE 68123
Bob Quisenberry
(402) 292-2753

### NEVADA

Las Vegas PET Users Group
Suite 5-315
5130 E. Charleston Blvd.
Las Vegas, NV 89122
Gerald Hasty

Southern Nevada Commodore Group
905 Biljac St.
Las Vegas, NV 89128
Joseph Windolph
363-2519

SOG Commodore Users Group
c/o IC Electronics
4011 W. Charleston Blvd.
Las Vegas, NV 89102
Dave Gorking
(702) 870-4201

Compu Club 64
4220 S. Maryland Parkway
Bldg. B - Suite 403
Las Vegas, NV 89109
Cindy Springfield
(702) 369-7354

C-Run
P.O. Box 70473
Reno, NV 89570
Franklin Miller

### NEW HAMPSHIRE

Northern New England Computer Society
P.O. Box 69
Berlin, NH 03570

C-64 U.S.E.R.S. User Software Exchange Pro
P.O. Box 4022
Rochester, NH 03867

TBH VIC-NICs
P.O. Box 981
Salem, NH 03079

### NEW JERSEY

The Bell Communication Research Commodore Users Group
Rm. 17-32 2883
Basking Ridge, NJ 07920
Walter Hobbie
(201) 221-4427

ACGNJ PET/VIC/CBM User Group
30 Riverview Terr.
Belle Mead, NJ 08502
J. M. Pylka
(201) 359-3862

Bordentown Area Commodore Users Group
10 Spring St.
Bordentown, NJ 08505
Joe Griner
(609) 298-6275

Cumberland County Commodore Users Group
28 Parker St.
Bridgeton, NJ 08302
William Fleming
(609) 451-7793

South Jersey Commodore Users Club
P.O. Box 4205
Cherry Hill, NJ 08034
Fred Herrmann
(609) 227-7905

VIC-TIMES
46 Wayne St.
Edison, NJ 08817
Thomas R. Molnar

Cape-Atlantic Commodore Users Group
1515 Shore Rd.
Lincoln, NJ 08221
B.J. Chadwick
398-4044

Educators Advisory
P.O. Box 186
Medford, NJ 08055
John Hanfield
(609) 953-1200

Monmouth Commodore/PET Users Club
25 Fox Wood Run
Middleton, NJ 07748
Stan Gawel
(201) 671-4059

Parsippany Computer Group
51 Ferncliff Rd.
Morris Plains, NJ 07950
Bob Searing
(201) 267-5231

Morris Area Commodore Users Group (MACUG)
61 Early St.
Morristown, NJ 07960
Tom Limoncelli
(201) 267-5088

Rancocas Valley Users Group
P.O. Box 234
Mt. Laurel, NJ 08054
4th Tues. 7pm
M. Eisenbacher
(609) 267-1912

INFO 64
16 W. Ridgewood Ave.
Ridgewood, NJ 07450
Dave Garaffa
(201) 447-4422

VIC Software Development Club
77 Fomalhaut Ave.
Sewell, NJ 08080
H. P. Rosenberg

Somerset Users Club
49 Marcy St.
Somerset, NJ 08873
Robert Holzer

Ewing Commodore Users Group
11 Van Saun Dr.
Trenton, NJ 08628
last Wed. of month 7-9 p.m.
John C. Jones
(609) 882-4826

VIC 20 User Group
67 Distler Ave.
W. Caldwell, NJ 07006
G. M. Amin
(201) 284-2281

Jersey Shore Commodore Users Group
Wall Township First Aid Building
1905 Monmouth Blvd.
Wall Township, NJ
3rd Thurs of month @ 7
Bob McKinley (201) 542-2113
G Decker 223-1387

Commodore Friendly User Group
49 Hershey Rd.
Wayne, NJ 07470
Rich Pinto/Colin Campbell
(201) 696-8043

### NEW MEXICO

Commodore Users Group
6209 Leslie Place
Albuquerque, NM 87109
Danny Byrne
(505) 821-5812

Southern New Mexico Commodore Users Group
P.O. Box 4437
Las Cruces, NM 88001
David Selwyn
(505) 522-7622

### NEW YORK

Capitol Dist. 64/VIC 20 Users Group
363 Hamilton St.
Albany, NY 12210
Bill Pizer
(518) 436-1190

505-84-6667 E-3S 5th Gen. Hosp.
APO New York, NY 09154
Gary Lee Crowell

Commodore 64 Berlin Users Group
Co. B USAFS Berlin
Box 9723
APO New York, NY 09742
Charles D. Blagburn

Commodore Computer Users Group Heidelberg
P.O. Box
APO New York, NY 09102
Robert H. Jacquot

VIC 20 User Club
339 Park Ave.
Babylon, NY 11702
Gary Overman
(516) 669-9126

Bayside VIC Users
23-20 Bell Blvd.
Bayside, NY 11360
Marc Gerstein

Commodore Computer Club
Publications Dept.
1111 Stewart Ave.
Bethpage, NY 11714
Neil Threulsen
(516) 575-9558

Brooklyn Bytes
10805 Flatlands 9th St.
Brooklyn, NY 11236
1st Tuesday of month
Bruce Gittman

Manhatten 64
c/o Steve Lazarowitz
1440 Freeport Loop
Brooklyn, NY 11239
Larry Thompson
(212) 647-4266

VIC User Group
1250 Ocean Ave.
Brooklyn, NY 11230
Dr. Levitt
(212) 859-3030

VIC Information Exchange Club
336 W. 23 St.
Deer Park, NY 11729
Tom Schiegel
SASE & ph. pl.

LIVICS (Long Island VIC Society)
20 Spyglass Lane
East Setauket, NY 11733
Lawrence Stefani
(516) 751-7844

Queens N.Y. Users Group
67-42 Harrow St.
Forest Hills, NY
Sam Soltan

Naples Commodore Users Group
P.O. Box 11
FPO, NY 09521
Donald Schmidt

LIVE (Long Island VIC Enthusiasts)
17 Picadilly Rd.
Great Neck, NY 11023
Arnold Friedman

long Island PET Society
Harborfields HS
Taylor Ave.
Greenlawn, NY 11740
Ralph Bressler

The Upstate Commodore Users Group
P.O. Box 5242
Arnot Mall
Horseheads, NY 14844
Chris Johnson

Hello
76-12 35th Ave.
Jackson Heights, NY 11372
Jared Sherman
Hudson Valley Commodore Club
P.O. Box 2190
Kingston, NY 12401
1st Wed. of month

VIC 20/64 Users Group
31 Maple Dr.
Lindenhurst, NY 11757
Pete Lobol
(516) 957-1512

Merrick Commodore Club
2158 Vine Dr.
Merrick, NY 11566
Howard Miller

Rockland County Commodore Users Group
P.O. Box 573
Nanuet, NY 10965
Ross Garber

New York 64 Users Group
222 Thompson St.
New York, NY 10012
Bruce Cohen
(212) 673-7241

New York Commodore Users Group
380 Riverside Dr.
New York, NY 10025
Ben Tunkelang
(212) 566-6250

The New York City VIC/64 Users Group-NYCUG
436 East 69th St.
New York, NY 10021
Jocelyn Woods
(212) 787-2854

VIC 20/64 Users Group
NYU
Waverly Place
New York, NY 10003
Lawrence Schulman
(212) 358-5155

Finger Lakes Commodore Users Group
c/o Rose City Computer Associates
229 West Union St.
Newark, NY 14513
(315) 331-1185

Norny Chug
P.O. Box 226
Norwood, NY 13668
2nd Wed. of month @ 7 p.m.
Andrew VanDuyne
353-4591

Commodoreee 64 Users Group
S.U.N.Y. at Oswego
Dept. of Industrial Arts
Oswego, NY 13126
John R. Boronkay

SPUG
4782 Boston Post Rd.
Pelham, NY 10803
Paul Skipski

West Chester County VIC Users Group
P.O. Box 146
Pelham, NY 10552
Joe Brown

Poughkeepsie VIC User Group
2 Brooklands Farm Rd.
Poughkeepsie, NY 12601
Joe Steinman
(914) 462-4518

The Commodore Users Group Rochester
78 Hardison Rd.
Rochester, NY 14617
Phone Evenings between 7-10
Tom Werenski
(716) 544-5251

VIC 20 User Group
Paper Service Division
Kodak Park
Rochester, NY 14617
David Upham

Adirondack Commodore 64 Users Group
205 Woodlawn Ave.
Saratoga Springs, NY
Paul Klompas
(518) 584-8960

SCUG (Schenectady Commodore Users Group)
c/o The Video Connection
Canal Square
Schenectady, NY 12305
1st Mon. of month
Timothy Davis

Commodore Masters
25 Croton Ave.
Staten Island, NY 10301
Stephen Farkouh

VIC Users Club
76 Radford St.
Staten Island, NY 10314
Michael Frantz

VIC Users Group
c/o Stoney Brook Learning Center
1424 Stoney Brook Rd.
Stoney Brook, NY 11790
Robert Wurtzel
(516) 751-1719

Commodore Sig Computer Club of Rockland
P.O. Box 233
Tallman, NY 10982
Peter Bellin
(914) 357-8941

Mohawk Valley Commodore Users Group
P.O. Box 343
Tribes Hill, NY 12177
2nd Tues. of month @ 7 p.m.
William Nowak
(518) 829-7576

L&M Computer Club VIC 20 & 64
4 Clinton St.
Tully, NY 13159
Dick Mickelson
(315) 696-8904

Utica Commodore Users Group
1801 Storrs Ave.
Utica, NY 13501
Phil Rothstein
(315) 733-2244

Chautauqua County Commodore Users Group
c/o Sector One Computer
19-21 East Main St.
Westfield, NY 14787
Mark Dunlap
(716) 326-2222

PET User Club of Westchester
P.O. Box 1280
White Plains, NY 10602
Ben Meyer

VIC 20 User Club
151-28 22nd Ave.
Whitestone, NY 11357
Jean F. Coppola

### NORTH CAROLINA

Raleigh VIC 20/64 Users Group
410-D Delta Court
Cary, NC 27511
Larry Diener
(919) 469-3862

Cleveland County Computer Club
P.O. Box 489
Grover, NC 28073
Todd Patterson
(704) 937-9124

Down East Commodores
302 Belltown Rd.
Havelock, NC 28532
Bruce Thedin
(919) 447-4536

VIC Users Club
Rt. 11
Hickory, NC 28601
Tim Gromlovits

VIC Users Club
Route 3
Lincolnton, NC 28092
David C. Fonenberry

Tryon Commodore 64 Club
P.O. Box 1016
Tryon, NC 28782

# USER GROUPS

1st Mon. of month at 7 p.m.
Robin Michael
(704) 859-6340

Microcomputer Users Club
Box 17142 Bethabara Sta.
Winston-Salem, NC 27116
Joel D. Brown

**NORTH DAKOTA**

CCCC (Capitol City Computer Club)
c/o Veterans Memorial Public Library
520 Avenue A East
Bismarck, ND 58501
Rolf Arnold

The Computer Club
Lock Drawer 1497
North Dakota State Penitentiary
Bismarck, ND 58502
Ed Reitan

**OHIO**

C.P.U. Connection
P.O. Box 42032
Brook Park, OH 44142
Danni Hudak

Chillicothe Commodore Users Group
P.O. Box 211
Chillicothe, OH 45601
William A. Chaney

Commodore Users of Blue Chip (Cincinnati)
816 Beecher St.
Cincinnati, OH 45206
Ted Stalets
(513) 961-6582

S.W.O.C.U.G.(SW. Ohio Commodore Users Gp.)
8401 Wicklow Ave.
Cincinnati, OH 45236
Joe Beresford

Southwestern Ohio Commodore Users Group
P.O. Box 399117
Cincinnati, OH 45239
2nd Wed. of month at 7 p.m.

Central Ohio Commodore Users Group
107 S. Westmoor Ave.
Columbus, OH 43204
Phillip H. Lynch
(614) 274-0304

Commodore Local Users Exchange (C.L.U.E.)
3040 Highcliff Ct.
Columbus, OH 43229
2nd mon. of month @ 6
Pat Murphy

Akron Area C-64 Users Group
2453 Second St.
Cuyahoga Falls, OH 44221
4th Sat. of month @ 1-4pm
Paul Hardy
(216) 923-4396

Commodore Users Group
18813 Harlan Dr.
Maple Heights, OH 44137
Carl Skala
(216) 581-3099

Marion Ohio Commodore Users Group (MOCUG)
775 Wolfinger Rd.
Marion, OH 43302
Van Munro
(614) 726-2630

Medina Commodore Users Group
P.O. Box 182
Medina, OH 44258
2nd Wed. @ 7 p.m.
Jill Carpenter
(216) 722-2611

Licking County 64 Users Group
323 Schuler St.
Newark, OH 43055
(614) 345-1327

11433 Pearl Rd.
Strongsville, OH 44136
Paul M. Warner

Commodore Computer Club of Toledo
734 Donna Dr.
Temperance, MI 48182
Gerald Carter

Dayton Area Commodore Users Group
679 Murray Hill Dr.
Xenia, OH 45385
Charles Tobin
(513) 372-4077

**OKLAHOMA**

Commodore Users of Bartlesville
1704 S. Osage
Bartlesville, OK 74003
Fred Mayes
(918) 336-0233

Southwest Oklahoma Computer Club
c/o Commodore Chapter
P.O. Box 6646
Lawton, OK 73504
meets 1

Commodore Users Group
Muskogee Computer Society
202 S. 12th St.
Muskogee, OK 74401
Steve Ford

Commodore Users of Norman
209 Brookwood
Noble, OK 73068
Matt Hager

Commodore Oklahoma Users Club
4000 NW 14th St.
Oklahoma City, OK 73107
Stanley B. Dow
(405) 943-1370

Commodore Users
Box 268
Oklahoma City, OK 73101
Monte Maker

Greater Oklahoma Commodore Club
1401 N. Rockwell
Oklahoma City, OK 73127
Randy Hill
(405) 789-3229

Tulsa Area Commodore Users Group
7804 N. 117th E. Ave.
Owasso, OK 74055
Craig Bowman
(918) 272-9755

**OREGON**

Jefferson State Computer Users Group-JUG
2355 Camp Baker Rd.
Medford, OR 97501
John Newman

Southern Oregon VIC/64 Users Group
3600 Madrona Lane
Medford, OR 97501
James Powell
(503) 779-7631

NW PET Users Group
2134 N.E. 45th Ave.
Portland, OR 97213
John F. Jones

United States Commodore Users Group
P.O. Box 2310
Roseburg, OR 97470
Richard Tsukiji
(503) 672-7591

**PENNSYLVANIA**

Lincoln Technical Inst.
5151 Tilghman
Allentown, PA
2nd & 4th Thurs. @ 7
Alan Karpe
(215) 770-1032

Bellwood - Altoona Users Group
1433 - 13th Ave.
Altoona, PA 16603
D.N. Dantof
(814) 942-9565

COMPSTARS
130 Blue Teel Circle
Audubon, PA 19403
Meet at Audio Video Junct.
Mike Norm

Worldwide Commodore Users Group
P.O. Box 337
Blue Bell, PA 19422
David Walter

Scranton Commodore Users Group
P.O. Box 211
Clarks Summit, PA 18411

Clifton Heights Users Group
P.O. Box 235
Clifton Heights, PA 19018

VIC 20 Programers
c/o Watson Woods
115 Old Spring Rd.
Coatesville, PA 19320
Robert Gougher

Castle Commodore Computer Club
RD #1
Edinburg, PA 16116
3rd Thursday
D. Wade
(216) 673-9261

Commodore Users Group
3021 Ben Venue Dr.
Greensburg, PA 15601
Jim Mathers
(412) 836-2224

NADC Commodore Users Club
248 Oakdale Ave.
Horsham, PA 19044
Norman McCrary

Westmoreland Commodore Users Club
c/o DJ & Son Electronics
Colonial Plaza
Latrobe, PA 15650
Jim Mathers

CACC (Capitol Area Commodore Club)
P.O. Box 333
Lemoyne, PA 17043
Geoffrey Hebert
(717) 732-5255

PET User Group
P.O. Box 371
Montgomeryville, PA 18936
Gene Beals

Eight Squared
Mindy Skelton
P.O. Box 76
Mount Holly Springs, PA 17065
(717) 766-5185 or
(717) 486-3274

A-K 64 Users Group
1762 Fairmont St.
New Kensington, PA 15068
2nd & 4th Tues. of month
Alton E. Glubish
(412) 335-9070

G.R.C. User Club
300 Whitten Hollow Rd.
New Kensington, PA 15068
Bill Bolt

Boeing Employees Personal Computer Club
The Boeing Vertol Co.
P.O. Box 16858
Philadelphia, PA 19142
Jim McLaughlin
(215) 522-2257

Oxford Circle 64 User Group
Trinity Church
6900 Rising Sun Ave.
Philadelphia, PA 19111
3rd Mon. of month 7
Roger Nazeley(215) 535-9021
(215) 743-8999

PACS Commodore Users Group
LaSalle College
20th & Olney Ave.
Philadelphia, PA 19141
Stephen Longo
(215) 951-1258

VIC Software Development Club
440 W. Sedgwick
Apt. A-1
Philadelphia, PA 19119
Tracy Lee Thomas
(215) 844-4328

PPG (Pittsburgh PET Group)
2015 Garrick Dr.
Pittsburgh, PA 15235
Joel A. Casar
(412) 371-2882

G/C Computer Owners Group
c/o Gilbert Associates
P.O. Box 1498
Reading, PA 19607
Jo Lambert (215) 775-2600
Extention 6472

Penn Conference Computer Club
c/o Penn Conference of SDA
720 Museum Rd.
Reading, PA 19611
Dan R. Knepp

Bits & Bytes
1015 Dale Rd.
Secane, PA 19018
Dave Boodey
(215) 544-5875

4820 Anne Lane
Sharpsville, PA 15150
Gene Planchak
(412) 962-9682

Upper Buxmont C-64 Users
655 Bergey Rd.
Telford, PA 18969
Don Roques
(215) 723-7039

CACCC-Centre Area Commodore Computer Club
214 Computer Building
University Park, PA 16802
Bill Hillner
(814) 237-5912

Commodore Users Group
781 Dick Ave.
Warminster, PA 18974
Matt Matulaitis

Main Line Commodore Users Group (MLCUG)
1046 General Allen Lane
West Chester, PA 19380
Emil Volcheck
(215) 388-1581

The Commodore Users Club of S.E Pittsburgh
c/o Groves Appliance & TV
2407 Pennsylvania Ave.
West Mifflin, PA 15122
Charles Groves

West Branch Commodore Users Group
P.O. Box 995
Williamsport, PA 17703
Gene Loveland
(717) 323-7901

**PUERTO RICO**

VIC 20 User Group
655 Hernandez St.
Miramar, PR 00907
Robert Morales

Commodore Users Group of Ponce
BP5 Ext. Las Delicias
Ponce, PR 00731
(809) 844-5733

CUG of Puerto Rico
RFD #1
San Juan, PR 00914
Ken Burch

**RHODE ISLAND**

Commodore Users Group
c/o Data-Co.
978 Tiogue Ave.
Coventry, RI 02816
Victor Moffett
(401) 828-7385

Irving B. Silverman
160 Taunton Ave.
E. Providence, RI 02914
Michelle Chavani

Newport VIC/64 Users
10 Maitland Ct.
Newport, RI 02840
Dr. Matt McConeghy
(401) 849-2684

RICE (Rhode Island Computer Enthusiasts)
198 Morris Ave.
Pawtucket, RI 02860
Michael Skelton
(401) 728-8602

**SOUTH CAROLINA**

Beaufort Technical College
100 S. Ribaut Rd.
Beaufort, SC 29902
Dean of Instruction

Commodore Users Society of Greenville(CUS)
Horizon Records-Home Computers
347 S. Pleasantburg Dr.
Greenville, SC 29607
Bo Jeanes
(803) 235-7922

The Executive Touch C-64 & VIC 20 Users
208 Hwy 15
Myrtle Beach, SC 29577
Patricia Watkins
448-8428

The Charleston Computer Society
P.O. Box 5264
N. Charleston, SC 29406
3rd Tues. of month at 7 p.m
Jack Furr
(803) 747-0310

Spartanburg Commodore Users Group
803 Lucerne Dr.
Spartanburg, SC 29302
James Pasley
(803) 582-5897

Commodore Computer Club of Columbia
P.O. Box 2775
Cayce
West Columbia, SC 29171
Chuck Howard-Sect./Tres.

**SOUTH DAKOTA**

PET User Group
515 South Duff
Mitchell, SD 57301
Jim Dallas
(605) 996-8277

VIC/64 Users Club
608 West 5th
Pierre, SD 57501
Larry Lundeen
(605) 224-4863

**TENNESSEE**

Commodore User Club
Metro Computer Center
1800 Dayton Blvd.
Chattanooga, TN 37405
Mondays 7

Jackson Commodore Users Group
31 Carriage House Dr.
Jackson, TN 38305
Rick Crone
(901) 668-8958

ET 64 Users Group
P.O. Box 495
Knoxville, TN 37901
Walt Turner
(615) 966-8478

Metro-Knoxville Commodore Users Club
7405 Oxmoor Rd.
Knoxville, TN 37931
2nd Thurs. 6
Ed Pritchard
(615) 938-3773

Memphis Commodore Users Club
2476 Redvers Ave.
Memphis, TN 38127
Harry Ewart
(901) 358-5823

Nashville Commodore Users Group
P.O. Box 121282
Nashville, TN 37212
3rd Thurs.at Cumberland Mus
Dave Rushing
(615) 331-5408

**TEXAS**

Commodore Users Group (Austin)
P.O. Box 49138
Austin, TX 78765
Dr. Jerry D. Frazee

Corpus Christi Commodores
P.O. Box 6541
Corpus Christi, TX 78411
Bob McKelvy
(512) 852-7665

Gulf Coast Commodore Users Group
P.O. Box 128
Corpus Christi, TX 78403
Lawrence Hernandez
(512) 887-4577

Tarant County Commodore 64 Club (TCCC)
1901 Lanewood
Fort Worth, TX 76112
Jeff Speed

VIC 20 Users Group
6416 Brookhaven Trail
Ft. Worth, TX 76133

# USER GROUPS

Jeff Southerland
(817) 346-1407

CHUG (Commodore Houston Users Group)
8738 Wildforest
Houston, TX 77088
John Walker
(713) 999-3650

Savid Computer Club
312 West Alabama
Suite 2
Houston, TX 77006
Davi Jordan

Mid-Cities Commodore Club
413 Chisolm Trail
Hurst, TX 76053
Garry Wordelman

ICUG (Irving Commodore Users Group)
3237 Northgate #1289
Irving, TX 75062
Robert Hayes
(214) 252-7017

Longview Users Group
P.O. Box 2504
Longview, TX 75606
Joyce Pope
(214) 759-3459

South Plains '64' Users Group
7709 Avenue 'W'
Lubbock, TX 79423
John N. Bottoms
(806) 745-4381

VIC Users Group
3817 64th St.
Lubbock, TX 79413

1110 Texas Ave.
Mart, TX 76664
James Meeker
(817) 876-2710

Commodore Computer Club (C3)
2217 N. Sumner
Pampa, TX 79065
every other Thurs. 7 p.m.
Randy Mills
(806) 665-3444

64 Users Group
2421 Midnight Circle
Plano, TX 75075
S. G. Grodin

SCOPE
P.O. Box 3095
Richardson, TX 75083
2nd Sat. of month @ 1

P.O. Box 652
San Antonio, TX 78293
Larry Williams

Interface Computer Club
814 North Sabinas
San Antonio, TX 78207
M.E. Garza

The Great Northwest CBM 64 Users Group
6302 War Hawk Dr.
San Antonio, TX 78238
Randy
647-3881

Commodore Users Group
624 Bellview St.
Sulphur Springs, TX 75482
Danny Miller

PET User Group
Texas A & M
Microcomputer Club
Texas A & M, TX
John Bowen

The Woodlands Commodore Users Group
3 Splitrock Rd.
The Woodlands, TX 77380
Andrew Gardner
(713) 292-8987

Crossroads Commodore Users Group
417 Irma Dr.
Victoria, TX 77901
meets twice a month
Jerry Guy
(512)575-0342

**UTAH**

The Commodore Users Group
652 West 700 North
Clearfield, UT 84015
Rodney Keller
(801) 776-3950

Northern Utah VIC & 64 Users Group
P.O. Box 533
Garland, UT 84312
David Sanders

The Commodore Users Club
742 Taylor Ave.
Ogden, UT 84404
Todd Woods Kap

Utah PUG
2236 Washington Blvd.
Ogden, UT 84401
Jack Fleck

Uintah Basin Commodore Users Club
P.O. Box 1102
Roosevelt, UT 84066
2nd & 4th Thursday of month
Terry Hall

Mountain Computer Society
P.O. Box 1154
Sandy, UT 84091
Dave Tigner

The VIClic
799 Ponderosa Dr.
Sandy, UT 84070
Steve Graham

VIC 20 Users
324 North
Smithfield, UT 84335
Dave DeCorso

**VERMONT**

Burlington Area Commodore Users Group
6 Mayfair
South Burlington, VT 05402
Steve Lippert
658-4160

**VIRGINIA**

Alexandria Users Group
1206 Westgrove Blvd.
Alexandria, VA 22307
Jeff Hendrickson

Franconia Commodore Users Group
J. Marshall Library
6209 Rose Hill Dr.
Alexandria, VA 22310
3rd Tues. of month
Mark Sowash
(703) 971-5021

Arlington VICtims (20/64)
Arlington Community Center
4501 Arlington Blvd.
Arlington, VA 22204
2nd Wed. of month @ 7 p.m.
Clifton M. Gladney
(703) 524-0236

VIC 20 Victims
4301 Columbia Pike #410
Arlington, VA 22204
Mike Spengel
(703) 920-0513

Dale City Commodore Users Group
4303 Hemingway Dr.
Dale City, VA 22193
Pat Sullivan
(703) 590-4998

135 Beverley Rd.
Danville, VA 24541
David Gray

PENTAF (Pentagon)
9912 Colony Rd.
Fairfax, VA 22030
Ralph Poole
(703) 273-1337

Commodore Users of Franklin
1201 N. High St.
Franklin, VA 23851
D. Bruce Powell
(804) 562-6823

Frdericksburg Computer Club
P.O. Box 1011
Fredericksburg, VA 22402
Shelkee Asso.
Steven Northcutt
(703) 371-4184

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Milwaukee, WI 53221
Theodore J. Polozynski

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Milwaukee, WI 53217
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Oregon, WI 53575
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# User Group Support Program

Commodore is creating a program to support Commodore User Groups.

The two major components—an electronic bulletin board on CompuServe and a newsletter are now available.

The electronic bulletin board is a dedicated section of the Commodore Information Network of CompuServe accessible only by "Approved" User Groups. It will be used for direct communication as well as Commodore announcements.

The newsletter, INPUT/OUTPUT, will include announcements, user group programs, calender of events, letters, questions, product specifications, programs, and surveys. It will be a newsletter FOR user groups BY user groups supported by Commodore without advertisements.

For future issues of the newsletter Commodore is accepting announcements of user group activities, articles of interest, letters to the editor, and general questions. Please forward all correspondence with the name of your user group to:

Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
Attn: Mario Eisenbacher
Editor, INPUT/OUTPUT


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Circle Reader Service No. 15

 Continued from Pg. 71

said I would love to but I didn't think that I was ready to start my own project. He said not to worry; he wouldn't start me on something that I wasn't ready for. This was the beginning of the development of the Commodore 64 version of *Solar Fox*.

I started playing that game more and more often but nothing more was said about when I would start, or if it would be my project.

At that time, Rick Cotton was working on *Gorf*, Jeff Bruette on *Wizard of Wor*, Andy Finkel on *DragonsDen*, Bill Hindorff on *Blueprint*, and Cyndie Merten on a demo cartridge. That left Dave Holmes and myself working on subroutines for different projects.

A month later, Cyndie Merten had finished the demo and John Mathias decided that either she or I should start *Solar Fox*. Cyndie and I resolved the problem in a professional manner. We flipped a coin and I won.

## Converting Solar Fox

When we do a game conversion, Bally/Midway gives us an arcade machine and the instruction manual. That is all. The method we use is to play the game as much as possible to learn all the features. Then we start duplicating what we see and feel in the original game, so it comes out the same on the computer.

I started by designing the background screen. I knew from the machine that I needed a grid that was 12 across and 11 down. I also knew that it couldn't look exactly like the original because their screen is turned on its side. I designed about six different screens before I found one that would fit on a TV screen and still give the feel of the arcade machine. You will notice that the bases on the top and bottom go across the score and the timer lines. This overlap is a compromise so I could make the grid taller.

The next thing I did was to make the crucial decision about which objects would use sprites and which would use graphic characters. A sprite is a moveable block object. It can be moved across a background without destroying what is in the background. A character can be moved on the screen but it will destroy a background. The 64 has eight sprites available on any one screen. *Solar Fox* has 16 moveable objects.

I chose to use sprites to create the bases on the edge, the player, the player's missile, the blue gear and the little guy who skits across the screen. That left the eight deadly missiles as characters. Following this decision, I got down to heavy programming.

I believe that the player movement is the most important part of an arcade-style game. What good are fancy graphics if the player can't control his man? I wrote three different joystick routines before I had one that felt good with the Commodore joystick. It's funny how that works because, although I have many brands of joysticks, I still prefer the Commodore for *Solar Fox* because the routine was written with that tight feel in mind. (As you may have noticed by now, I write most routines many times before I like the way they look or react.)

## Disaster Overcome

About half way through the project, I realized that my major decision about sprites was wrong. I had the bases moving and animated, the fuzors plotted and being erased by the player, and the player moving smoothly when I realized that I had run into a brick wall. The deadly missiles just wouldn't look good in character graphics. I was able to move those red things without any trouble. In fact, I had boxes flying across the screen. But as soon as I tried to animate them, everything fell apart. If I included the grid in each red thing, it took more than the allowable 256 characters. If I left the grid out, it looked bad. If I left the grid out and then OR'd in the grid when I put it on the screen, it took too much time and made the game too slow. This problem meant throwing away two months of work. I was devastated.

However, after discussions with Andy Finkel, I decided to multi-sprite. A multi-sprite routine is a way to make it look like there are more than eight sprites on the screen. What I did was to time my sprites with the raster beam that sweeps down the TV screen 60 times a second. I put the sprites at the top of the screen, the raster draws them, then I move the sprites to the bottom before the beam gets there. The raster can then draw them again. Using this method, I have seen David Berezowski put as many as 64 sprites on the screen at the same time. He has 32 sprites in his version of *Satan's Hollow*.

To make my multi-sprite routine as simple as possible, I made the bases characters, the player and his missile two regular sprites, and had the little guy and the blue gear share a sprite. The remaining five sprites are multi-sprited to make the eight red things.

## The Final Hurdle

Things went smoothly for a few months, until I ran into my next big problem. I was working on the challenge rack patterns. The trouble was that no matter how hard I tried, I couldn't get far enough into the game to see the last four patterns. We rigged a freeze switch so that if I got far enough, I could freeze the game then copy the pattern, but I just couldn't get far enough.

When you turn on the Bally/Midway machine in our arcade room, the initials in the high score page read "DESIGNED BY ARCADE ENGINEERING." So I called the Engineers. After I explained my dilemma, they sent new ROMs to me. These ROMs had a patch which turned off the bad red things. This meant that I could play as far as I needed to without dying. I quickly got the rest of the challenge rack patterns.

## I Become a Game Programmer

About a month before my deadline, I was asked if I was still on schedule. As many of you know, there is no such thing as a computer program that is ready on time. But I was pretty close. The only trouble was that I still had about a month's worth of work—if I didn't do the sounds. They really wanted this one on time so they had Cyndie Merten do the sounds. She did an excellent job and I was lucky. When I put in her sound routine, there were no major blow-ups. There were just a few little problems.

Cyndie's work made *Solar Fox* a first for the games group. It was on time. Well almost. It was actually two weeks late.

I'm officially a game programmer now because I finished a project. I'd like to thank the staff at Commodore and Tom Gilbert from Arcade Engineering for making the Commodore 64 version of *Solar Fox* possible. **C**

 *Continued from Pg. 73*

about "bugs" in the software itself. There was a time when he could concentrate on property claims—say, the loss of valuable data. But today he must keep an eye on possible claims for personal injury as well, because software is now employed for diet control, exercise, first-aid assistance or biofeedback. Each of these subjects can give rise to enormous claims for misrepresentation, improper design or breach of warranty.

Then, following the investigation of potential liability claims, the lawyer will turn to ensuring your rights to the software.

Under copyright law, normally, the writer and designer of software is considered the "author" and consequently the owner of the software. So if the lawyer is satisfied that you are the author, or that you have an adequate assignment of rights from the author, this issue can be resolved quickly.

But many software packages for microcomputers are actually developed by groups of people. So if you are one of several co-developers, each of whom has nonexclusive rights to the software, you may be hamstrung. You will not be able to enter into contracts with a distributor or publisher unless you have some arrangement among the co-developers. Suddenly there may be many lawyers in the picture—yours and those representing your co-developers. And needless to add, many lawyers at work do not make for harmony, dispatch or economy.

If you are going to market under a license or contract of sale from the original owner, the lawyer will perform a thorough scrutiny of all the documents that prove the license or sale. He will particularly look for conditions or limitations. These are common and they can be numerous.

For example, does it exclude certain channels of distribution—say, direct sales to corporations? What about geographical limitations? Can you market your software everywhere in this country? What about overseas? How about use? The license may be limited to certain computers.

Another thing must be considered in every license—the future. What rights do you have to new releases of the software or upgraded versions?

Finally, and of course of the most concern to those involved in any license agreement, are the royalties. But beyond their payment and amount, the lawyer will also be worried about minimum levels of royalty. He will also be concerned about whether a distributor or publisher must maintain certain marketing efforts in order to keep their rights to a product.

*A lawyer will be concerned about whether a distributor or publisher must maintain certain marketing efforts in order to keep their rights to a product.*

On another track, you and the attorney may be concerned with what is called "derived software." Frequently, a piece of software may be developed from previously licensed software and may carry legal obligations that relate to the earlier software. For instance, software publishers often have options to publish upgraded or new releases. If your software is an upgrade or new version of an existing product and thus falls within that option, the option holder could well be heard from as soon as you attempt to go to market.

That taken care of, and with barely a pause for a deep breath, the lawyer's investigation will plow ahead—this time considering the issue of trade secrets. The source code for the software (i.e., the programming language in which the software was written) may contain valuable confidential programming techniques and tools—in other words, trade secrets. The owner of a copyrighted piece of software does not necessarily own these trade secrets that lie within the software. Thus it is important to decide the extent to which you, the client, control access to these trade secrets, especially when the trade secrets give the software package a competitive edge over similar software marketed by other people.

The continuing inquiry by the attorney then leads to the issue of certain commercial rights. Some software packages, for instance, owe much of their value to the ownership of certain publicity rights. For instance, a hockey simulation game for home computers may simulate the performance of a named professional hockey player or players, or a financial management program may be marketed under the name of a nationally famous financial expert. The attorney must be certain that he has the necessary releases and licenses before he allows proceeding with this type of product.

All the while, the attorney will be making sure that your rights are legally in force. Copyrighted software should display a proper copyright notice on all physical storage media, documentation, packaging, initial monitor displays and printed output. All copyright assignments and "work-for-hire" arrangements involving independent contractors, should be properly documented as required by the 1976 Copyright Act. Every person or company who has had access to trade secrets contained in the software should be subject to an adequate confidentiality agreement, preferably in writing.

With these many concerns taken care of, plus a good many others that will probably arise in individual situations, the lawyer will no doubt look up and smile contentedly. But, alas, not to inform you that you are finished—rather, that you are ready *to begin* to go to market.

Now it is time for you to become a licensor—to license a software distributor or publisher to market your product. And once many legal questions arise. A list of those questions, however, is too long for our purposes, here.

Nobody ever said taking software to market would be easy. But software is an infant industry, and a legally complex field to begin with. So perhaps it is best for you to concentrate on those potential millions at the end of the software rainbow. Certainly seeing a lawyer will take time. But it will not take forever. The trip to the law office is surely worth the opportunity that could await you. Otherwise, how sad to have a product the market wants and to lose it because of legal oversight. C

# QUESTPROBE

*Continued from Pg. 77*

main character in yet another game. Remember that everything mentioned in this answer is subject to change, because *Questprobe* is still a very young project, and very little has actually been written.

**John:** What was the biggest problem in programming the Commodore 64 version of the Hulk game?

**Scott:** The primary problem of dealing with the Commodore 64 was disk speed. We were able to obtain disk speeds twice as fast as normal, so the disk version of the Hulk game runs faster than anything on the market.

**John:** How much time are you devoting to the *Questprobe* project?

**Scott:** I am devoting as much time to *Questprobe* as needed. Usually my day consists of working at the company from nine to five, and programming at home from five to midnight. I think that you can now see why I don't have any hobbies.

**John:** What is your programming philosophy?

**Scott:** My philosophy concerning programming is to keep your work fairly structured and orderly. Personally, I prefer to use a bottom-up procedure, as opposed to a top-down method of programming.

**John:** What suggestions would you give to someone playing the first *Questprobe* game?

**Scott:** To get the most out of the games, the player should examine everything that he finds, and try to find a use for these items. Also, a little common sense will go a long way in solving the mysteries of *Questprobe*.

**John:** If you had to quit programming tomorrow, how would you like to be remembered by computer users?

**Scott:** I would hope that people would remember that I have made many contributions to the microcomputer industry. I was the first person to write an adventure game for a microcomputer. I created Adventure International in 1977, which is the oldest software publishing house selling to the retail market that I know of. I also wrote the first adventure game that was task-oriented, as opposed to just gathering treasures. Finally, I hope that people would remember that I've tried to give them software that they would enjoy, and that I determine what they want by talking with as many users as possible. **C**

# PERFECT GAME

*Continued from Pg. 69*

your game requires four steps: originality, using a popular computer, using the right programming language and sending in the required forms. Cretins can be dealt with, if you know how to handle them.

## TO SUMMARIZE

If you intend to ever market a game, you probably want more than simply being noticed. Give yourself the best possible chance—not just for acceptance but for smashing success—by applying these guidelines. They are, in fact, the very suggestions we at Epyx make to freelance designers who inquire about submitting a new game to us. Using them maybe you'll be the one who designs that dream of every software acquisitions manager—the Perfect Computer Game.

*The Language Barrier*. The first thing you need to know before you start writing a computer game is The Right Language. With all the fancy high-level languages around these days, you'd think you wouldn't have to program your game in assembly language. You'd think you could use BASIC, PASCAL, or maybe even FORTH. The bad news is that game companies demand assembly language, with very few exceptions. The good news is that if you can program in BASIC, you can probably learn assembly language without spilling any blood (well, very little, anyway).

*Sour Milk*. There are dozens of games around that look alike. It's a familiar story. Someone "borrowed" the idea of somebody else's hit game instead of milking his own creative juices. Stale ideas make stale games. If you want to sell your game to a publisher, make it original. This is one of the first questions publishers will ask when they look at your game. Is it original?

*On Dragon's Wings*. A good way to create a winning, original idea is to explore the fantasies that people have in common: driving a sleek, high-speed racecar, battling for truth, justice and freedom in distant galaxies, or soaring over a medieval landscape on dragon's wings. A game should let you escape reality, and the most successful games touch on fantasies that all of us share.

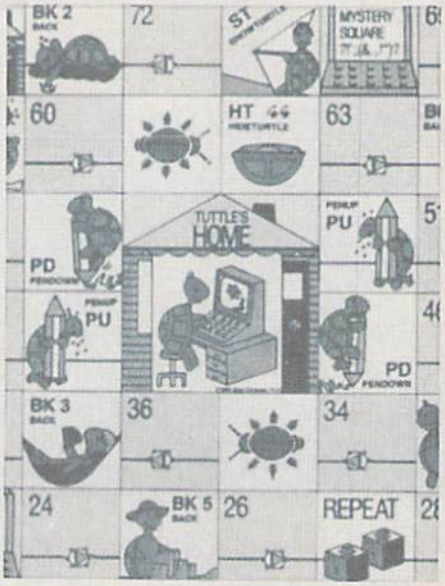
*Matters of Gray Matter*. Some of the most challenging and satisfying games are those which make you think. Introduce the element of strategy into your game. There's no better way to give a game depth and lasting interest; except, perhaps, by giving your audience the opportunity to acquire knowledge by playing your game. This doesn't mean that your game must be educational, although it certainly can be—it means that your game will be more satisfying to those who play it if they learn something new. Your game can impart tangible knowledge, like the facts you learn in Trivial Pursuit, or it can be more subtle. For example, when you play chess, you learn by exercising your powers of reasoning (whereas most computer games exercise only your wrist).

*The Razor's Edge*. Make your game challenging, but don't make it frustrating. Balance the difficulty on the razor's edge, where winning seems just out of reach but can be attained with a reasonable amount of effort. (When a game seems impossible, frustration sets in.) A difficult game can be made enjoyable if there are plateaus for the player to reach along the way. Your game probably ought to have increasing levels of difficulty; at the very least, it should have new challenges and unexpected twists and turns during the course of play.

*Abracadabra*. Remember that a computer game is nothing more than an illusion. To make the illusion believable, you must convince the player that the world in your game is real. You can give your game great sound and graphics to enhance its believability, but you don't have to stop there. Give your game a personality. Make it seem intelligent. Breathe life into your game and the illusion will be complete.

*Hello, Friend*. Most important of all, a good game should be like a good friend: easy to get along with. Long lists of commands that must be entered on the keyboard are confusing, frustrating and unnecessary. A friendly game can be played with nothing but a joystick. Use a menu with a pointer to handle command options and avoid using the keyboard unless it adds to the "world" you're trying to create (as in a text adventure). **C**

# LOGO Board Game




LOGOVILLE is a board game designed to help children ages five through 12 learn the most commonly used graphics commands in LOGO. No computer is needed to play the game and no prior computer experience is necessary. The game board is designed to simulate a computer monitor and the actions of the LOGO turtle.

By playing LOGOVILLE, children are helped to master 12 computer programming commands and the concepts associated with them. The game is fully compatible with virtually all versions of the LOGO language.

LOGOVILLE was developed by Dr. Brian Campbell, a university psychology professor and president of Tuttle Products. The game has been tested in preschools and elementary schools in Florida and is the first of a series of educational computer products featuring TUTTLE the turtle.

LOGOVILLE is ideal for home or classroom use. Educators with limited computer resources will find the product especially beneficial in helping introduce children to LOGO and promoting computer literacy. Parents will find the game to be an exciting off-the-computer activity for young children. C

# *Starmaze* Now Available for the Commodore 64

Sir-Tech Software has announced the release of its **Starmaze** arcade-style game for the Commodore 64.

**Starmaze** requires the player to maneuver a spaceship through a series of sixteen complex multi-colored mazes to recover nine power jewels in each maze. The mazes scroll smoothly across the screen in both horizontal and vertical directions so—in contrast to most other maze games—the **Starmaze** player's spaceship remains in the center of the screen while the maze moves past it, increasing the sense that the player is traveling with the ship.

In addition to the ship, each maze is populated by a variety of dangerous or hostile objects which the player must avoid or destroy. The maze passages are much larger than the ship and since the maze walls are elastic, the ship and other objects bounce if they hit the walls, creating extraordinary effects. C

# Software for Sports Lovers

Get ready for the P.G.A. next year with Adventure International's newest software package **Golf Championship.** Created by Englishman John G. Horan, **Golf Championship** is a brilliant high-resolution golf simulation available for the Commodore 64.

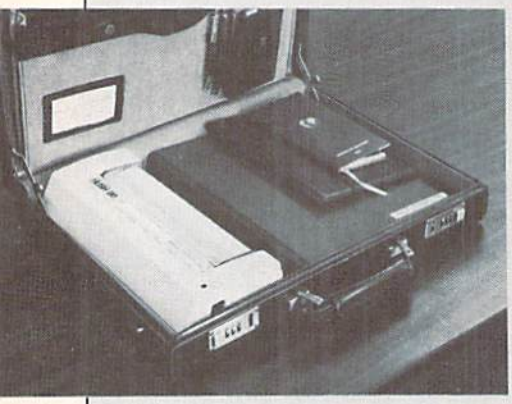
Everything but the 19th hole is included in this game. Challenge your friends by designing the course of your dreams (sand traps included) or play on one of the two premade courses. Player options include selecting the club of your choice, adding a hook or a slice to your swing and playing with three others at once.

This game requires strategy, judgement and skill and can help novice golfers improve their golf game. It is an enjoyable game for both young and old sports enthusiasts. C

# *Jury Trial II* Released for the Commodore 64

**Jury Trial II,** recently nominated by *Electronic Games* magazine for best multi-player computer game, is now being shipped for the Commodore 64.

The computer simulation casts its players in the roles of prosecutor and defense attorney, while the computer plays judge and jury. The players select jurors from a pool of hilarious characters and battle to convince the jury to convict or acquit the suspect. C



## Dot Matrix Printer

Ergo Systems of Menlo Park, California, has introduced a low cost, 80-column dot matrix thermal printer. Carrying a suggested list price of $159.99 complete with interface and cable, the HUSH 80 portable thermal printer features 80-column bidirectional printing at 80 characters per second, graphics at 4800 dots per square inch and a weight of only 28 ounces, making it the lightest portable printer available.

The HUSH 80 is offered in three models, each of which can be equipped with a built-in rechargeable nickel-cadmium battery pack as an option. The model HUSH 80CD provides direct interfacing to the Commodore line of computers. The HUSH 80P is a Centronics-type parallel interface version, while the HUSH 80S provides a serial RS232 interface. All HUSH 80 models typically include the interface, interface cable, 100-foot roll of thermal paper ready for use and a nine-volt AC wall transformer with power cable.

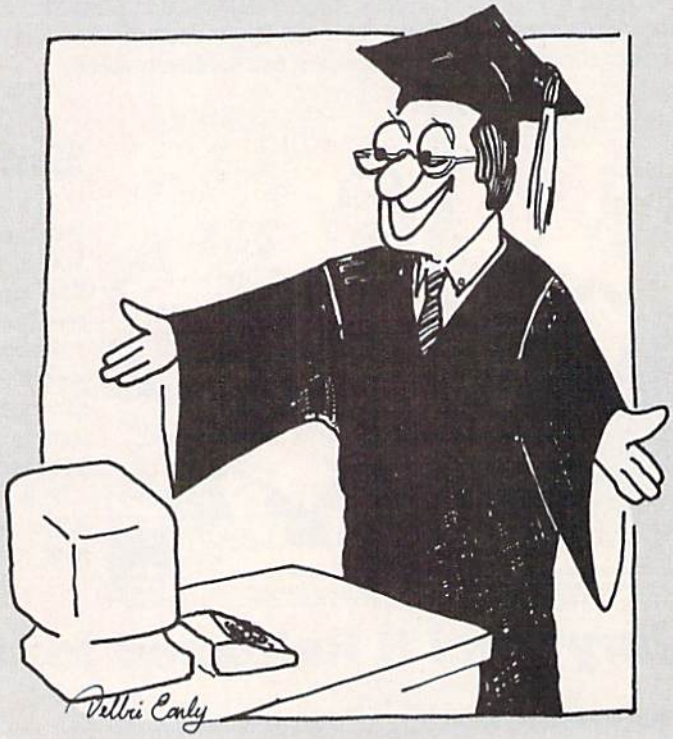
## Intro to Telecommunications

IM-Press of Ann Arbor, Michigan, has released the book **1-Hour Telecomputing** for any computer owner who wants to tap into the vast information networks but needs to learn the basics.

The book describes the RS-232 board and UART operation and why you need them, the purpose of terminal programs and features to look for, the difference between dumb and smart terminal programs, and what a modem is and why you need it. It also includes a glossary of terms, ASCII control codes, characters and their functions, appendices and a table of telecomputing resources.

## Commodore 64 Tutorial

Progressive Peripherals & Software, located in Denver, Colorado, has released **The Professor,** an educational tutorial designed to familiarize the user with basic functions available on the 64. On-screen illustrations, sound effects and full-color interactive graphics make learning easy. The program also provides an in-depth analytical approach to BASIC, the keyboard, sound and simple or advanced graphics.




## Software for the Auto Racer and Restorator

Car Soft of Tempe, Arizona, has announced two new programs for the Commodore 64, **Auto Racer's Diary** and **Automobile Restoration Record,** aimed at the personal enjoyment of automobiles.

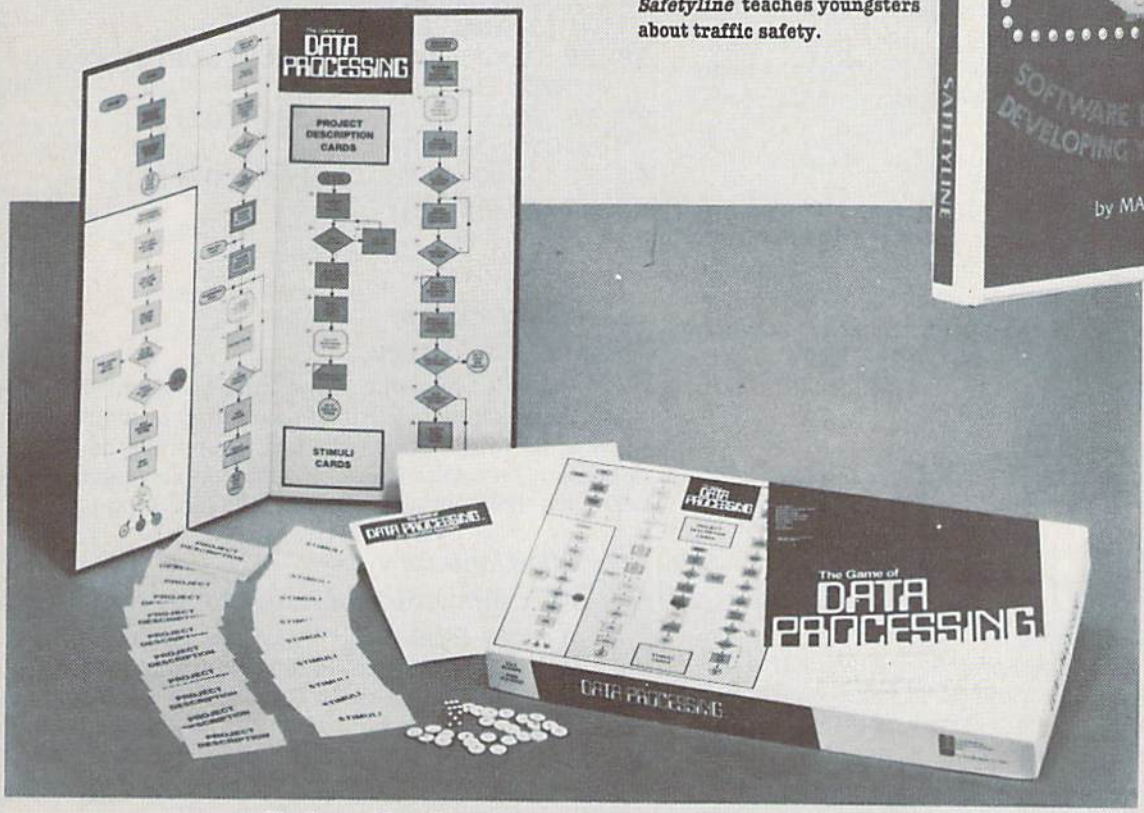
The **Auto Racer's Diary** is written for the amateur or professional race car driver who wishes to maintain records and statistics of racing activity throughout the season. Input includes over 30 race-day details such as times, speeds, distances, track expenses and chassis configurations.

The **Automobile Restoration Record** is for the enthusiast involved in a classic car restoration project who wishes to maintain records for insurance purposes or for simply following the car's history, car show activity and dollar investment throughout their ownership.

## Safety Software

Maximus of McLean, Virginia, announces the release of **Safetyline** for the Commodore 64, educational software aimed at children ages four to eight. Narrated by Max the Cat and featuring a little boy named Sam, **Safetyline** teaches lessons about traffic safety and what to do when lost. Through the interactive games, children also develop memory retention, spelling, vocabulary and problem-solving skills.

***Safetyline* teaches youngsters about traffic safety.**




**The *Game of Data Processing* requires both math and leadership skills.**

## Data Processing Career Game

Interested in learning about a career in data processing? Learning Innovations of Depew, New York, has released the **Game of Data Processing**, a board game designed for students, parents, educators and computer hobbyists who want to learn what data processing has to offer.

Combining the basic skills of programming, mathematics, accounting, analysis, leadership and teamwork in a strategy game, the **Game of Data Processing** introduces the player to the concepts, symbols and terms related to the computer environment. It does not require a computer to play.

## Kitchen Companion for the Commodore 64

Concept Development Associates of Bethesda, Maryland, has announced that **Micro Kitchen Companion** is now available for the 64. **Micro Kitchen Companion** is part of a series which includes **Micro Wine Companion, Bar Companion** and **Travel Companion.**

This program allows the owner to add recipes, edit existing recipes, index printed collections and create new recipe disks. It supports up to seven disk drives or hard disk volumes. Minimum requirement is one disk drive; number of recipes stored is limited only by the hardware used.

# GLITCH FIX

## *October/November 1984*
## *Our Users' Most Asked Questions*

On page 18, the author mentions a free program available from Commodore for producing an 80-column screen on the Commodore 64 when you are working with a modem. This program does exist, but it is not available from Commodore. Rather, it has been donated to the public domain by Frank Prindle and Eric Levitsky and can be downloaded from the Commodore Information Network on CompuServe if you have downloading software.

You can find the program by typing GO CBM 310 at any CompuServe prompt. This will take you to the Programming SIG. At the SIG's main menu, type XA7. Then, at the access menu, type BRO TERM80.*, which will allow you to view both the program and its documentation.

## *October/November 1984*
## *VIC/64 Utility*

The author writes that two minor errors appear in the program listing for the 64. First, line 20 should be deleted. It has no effect on the operation of the program and was left in by mistake. Second, in line 770 the character that appears as the numeral 2 should be the graphic character that results from pressing the Commodore logo key and the numeral 7 key together. The purpose is to return the 64 to power-up mode—light blue characters on a dark blue background.

## *October/November*
## *Houseplant for the 64*

Author Marilyn Sallee writes:

In answering a letter that *Power/Play* forwarded to me concerning "Houseplant for the 64," I found a potential glitch in the program. Line 190 may not appear to fit within the required 80 characters. If you leave out all spaces and use the abbreviated form of GOTO, it just barely fits. If this is too cumbersome, break line 190 into:

```
PROGRAM:  HOUSE PLANT FIX
190 A=-(C$="W")-2*(C$="F")-3*(C$="L")
    -4*(C$="R")-5*(C$="D")
191 ON A GOTO 200,300,400,500,1000
```

## *December/January*
## *New Kid on the Block*

The short program for the C16 Jim mentions in the text was left out. The program follows:

```
10 PRINT"□";:L=8:C=0
20 DIMA$(16):FORX=1TO16:READA$(X):NEXT
30 FORY=1TO16STEP4
40 T=1:FORX=YTOY+3
50 PRINT"■";
60 IFCTHENFORZ=1TOC:PRINT"■";:NEXT
70 FORZ=1TO6:COLOR1,X,L-Z:IFZ<>3THENPRINTTAB(T)"■      ":GOTO90
80 PRINTTAB(T)"■ "+A$(X)+" "
90 NEXT
100 T=T+10:L=8:NEXT:C=C+6:NEXT:COLOR1,1
110 GETKEYA$
120 S=S+1:SL=7-INT(S/16):SC=(SAND15)+1:COLOR0,SC,SL
130 PRINT"■COLOR "A$(SC),"LUM"SL"□"
140 IFSL>1THENGOTO110
150 COLOR0,2,7:END
160 DATABLAK,WHIT,RED ,CYAN,PURP,GREN,BLUE,YELL,ORGN,BRWN,YGRN,PINK,BGRN
170 DATALBLU,DBLU,LGRN
```

## *December/January*
## *Musical Sprites*

A few small corrections to this program will enhance your enjoyment of it:

```
PROGRAM:  PLAYER FIX.CS
12 IF X<0 THEN POKE V1,
   WF(0)AND 254'FNFF
13 IF Y<0 THEN POKE V2,
   WF(1)AND 254'FNIG
14 IF Z<0 THEN POKE V3,
   WF(2)AND 254'FNLH
38 IF O1<0 THEN O1=256-(O1+12)
   :GOTO 38'HRBP
39 IF O2<0 THEN O2=256-(O2+12)
   :GOTO 39'HRFQ
40 IF O3<0 THEN O3=256-(O2+12)
   :GOTO 40'HRZI
```

## *December/January*
## *Sound Effect Library*

If you ended up with some strange visual effects, that's because lines 380-1000 (beginning at the bottom of page 48) were accidentally picked up from the "VIC-O-Lantern" program we ran in October/November. You can leave them out of the "Sound Effects" program.

## *December/January*
## *Glitch Fix: Appointment Calendar*

The VIC 20 version of the "Appointment Calendar" is not a stand-alone program. Rather, it is composed of the lines you must change in the Commodore 64 version in order to use the calendar on the VIC 20. Substitute the lines in the VIC 20 version for the same-numbered lines in the version for the 64.

# HOW TO ENTER PROGRAMS in Power/Play

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

## SYNTAX ERROR

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270", type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parenthesis. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the 'wrong' line to look at. If the line the syntax error refers to has a function call (i.e., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

## ILLEGAL QUANTITY ERROR

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

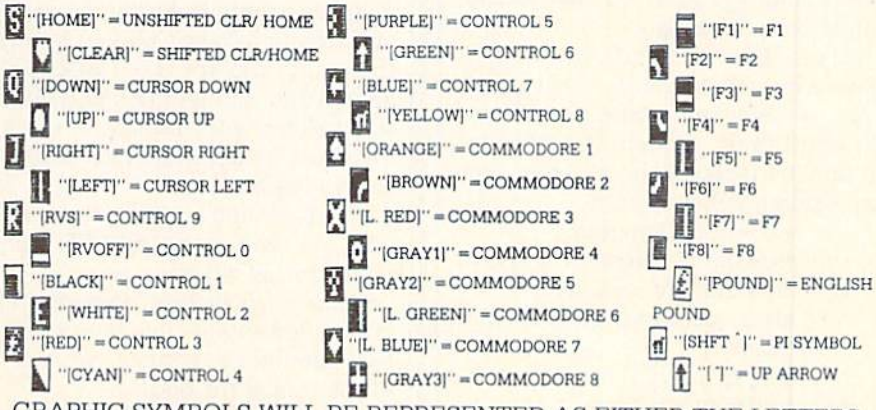
## OUT OF DATA ERROR

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

## OTHER PROBLEMS

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than 80 (or 88) characters on one line. You can enter these lines by abbreviating the commands when

## CHART OF SPECIAL CHARACTER COMMANDS




GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

## HOW TO CONT'D

you enter the line. The abbreviations for BASIC commands are on pages 133-134 of the VIC 20 user guide and 130-131 of the Commodore 64 user's guide.

If you type a line that is longer than 80 (or 88) characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed

### THE PROGRAM WON'T RUN!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is 'running'. Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

### IF ALL ELSE FAILS

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase you understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing

Send your questions to:

*Power/Play Magazine*
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem **C**

# How to Use the Magazine Entry Program

The Magazine Entry Program on page 127 is a machine language program that will assist you in entering the programs in this magazine correctly. It is for use with the Commodore 64 only and was written by Mark Robin using the IEA Editor/Assembler. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

### Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 50052, and just lets you know that the program is running. If everything is ok, the program will finish running and end. Then type NEW. If there is a problem with the data statements, the program will tell you where to look to find the problem.

Once the program has run, it is in memory ready to go. To activate the program, type SYS49152 and press RETURN. When the READY prompt is displayed, type TEST and press RETURN. You are now ready to enter the programs from the magazine.

### Typing the Programs

All the program listings in this magazine that are for the 64 have an apostrophe followed by four letters at the end of the line (i.e., 'ACDF). The apostrophe and letters *should* be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

### IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it *does not* enter that line into memory. This makes it impossible to enter a line incorrectly.

### Error Messages and What They Mean

There are six error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

**NO CHECKSUM:** This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

**QUOTE:** This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

**PARENTHESIS:** This means that you forgot (or added) a parenthesis somewhere in the line. Check the line in the magazine again and correct the parenthesis.

**KEYWORD:** This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT..) incorrectly. Check the line in the magazine again and check your spelling.

**# OF CHARACTERS:** This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

**UNIDENTIFIED:** This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word mispelled. Check the line in the magazine again and correct the mistake. **C**

## Magazine Entry Program

```
1 PRINT "[CLEAR]POKING-";
5 P=49152 :REM $C000
10 READ A$:IF A$="END"THEN 80
20 L=ASC(MID$(A$,2,1))
30 H=ASC(MID$(A$,1,1))
40 L=L-48:IF L>9 THEN L=L-7
50 H=H-48:IF H>9 THEN H=H-7
60 PRINT"[HOME,RIGHT12]"P;
70 B=H*16+L:POKE P,B:T=T+B:P=P+1
   :GOTO 10
80 IF T<>103233 THEN PRINT"MISTAKE IN
   DATA --> CHECK DATA STATEMENTS":END
90 PRINT"DONE":END
1000 DATA 4C,23,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,00,00,0D
1002 DATA 00,58,C1,5E,C1,66,C1,76
1003 DATA C1,83,C1,8F,C1,EA,EA,EA
1004 DATA 4C,83,C0,A2,05,BD,1D,C0
1005 DATA 95,73,CA,10,F8,60,A0,02
1006 DATA B9,00,02,D9,3C,C1,D0,0B
1007 DATA 88,10,F5,A9,01,8D,10,C0
1008 DATA 4C,1F,C1,60,A0,03,B9,00
1009 DATA 02,D9,38,C1,D0,E0,88,10
1010 DATA F5,A9,00,8D,10,C0,4C,1F
1011 DATA C1,60,A0,03,B9,00,02,D9
1012 DATA 34,C1,D0,E0,88,10,F5,A0
1013 DATA 05,B9,A2,E3,99,73,00,88
1014 DATA 10,F7,A9,00,8D,18,D4,4C
1015 DATA 1F,C1,E6,7A,D0,02,E6,7B
1016 DATA 4C,79,00,A5,9D,F0,F3,A5
1017 DATA 7A,C9,FF,D0,ED,A5,7B,C9
1018 DATA 01,D0,E7,20,5A,C0,AD,00
1019 DATA 02,20,A3,C0,90,DC,A0,00
1020 DATA 4C,EA,C1,C9,30,30,06,C9
1021 DATA 3A,10,02,38,60,18,60,C8
1022 DATA B1,7A,C9,20,D0,03,C8,D0
1023 DATA F7,B1,7A,60,18,C8,B1,7A
1024 DATA F0,35,C9,22,F0,F5,6D,05
1025 DATA C0,8D,05,C0,AD,06,C0,69
1026 DATA 00,8D,06,C0,4C,BD,C0,18
1027 DATA 6D,07,C0,8D,07,C0,90,03
1028 DATA EE,08,C0,EE,0B,C0,60,18
1029 DATA 6D,0A,C0,8D,0A,C0,90,03
1030 DATA EE,09,C0,EE,0C,C0,60,0A
1031 DATA A8,B9,11,C0,85,FB,B9,12
1032 DATA C0,85,FC,A0,00,A9,12,20
1033 DATA D2,FF,B1,FB,F0,06,20,D2
1034 DATA FF,C8,D0,F6,20,54,C3,20
1035 DATA 7E,C3,20,E4,FF,F0,FB,A0
1036 DATA 1B,B9,3F,C1,20,D2,FF,88
1037 DATA 10,F7,68,68,A9,00,8D,00
1038 DATA 02,4C,74,A4,4B,49,4C,4C
1039 DATA 54,45,53,54,41,44,44,91
1040 DATA 91,0D,20,20,20,20,20,20
1041 DATA 20,20,20,20,20,20,20,20
1042 DATA 20,20,20,20,20,20,91,0D
1043 DATA 51,55,4F,54,45,00,4B,45
1044 DATA 59,57,4F,52,44,00,23,20
1045 DATA 4F,46,20,43,48,41,52,41
1046 DATA 43,54,45,52,53,00,55,4E
1047 DATA 49,44,45,4E,54,49,46,49
1048 DATA 45,44,00,4E,4F,20,43,48
1049 DATA 45,43,4B,53,55,4D,00,50
1050 DATA 41,52,45,4E,54,48,45,53
1051 DATA 49,53,00,C8,B1,7A,D0,FB
1052 DATA 84,FD,C0,09,10,03,4C,C7
1053 DATA C1,88,88,88,88,88,B1,7A
1054 DATA C9,27,D0,13,A9,00,91,7A
1055 DATA C8,A2,00,B1,7A,9D,3C,03
1056 DATA C8,E8,E0,04,D0,F5,60,4C
1057 DATA F2,C2,A0,00,B9,00,02,99
1058 DATA 40,03,F0,F2,C8,D0,F5,A0
1059 DATA 00,B9,40,03,F0,E8,99,00
1060 DATA 02,C8,D0,F5,20,D7,C1,4C
1061 DATA 56,C2,A0,0B,A9,00,99,03
1062 DATA C0,8D,3C,03,88,10,F7,A9
1063 DATA 80,85,02,20,1B,C3,A0,00
1064 DATA 20,9B,C1,20,CA,C1,20,31
1065 DATA C2,E6,7A,E6,7B,20,7C,A5
1066 DATA A0,00,20,AF,C0,F0,CD,24
1067 DATA 02,F0,06,20,D7,C0,4C,12
1068 DATA C2,C9,22,D0,06,20,BC,C0
1069 DATA 4C,12,C2,20,E7,C0,4C,12
1070 DATA C2,A0,00,B9,00,02,20,A3
1071 DATA C0,C8,90,0A,18,6D,09,C0
1072 DATA 8D,09,C0,4C,33,C2,88,A2
1073 DATA 00,B9,00,02,9D,00,02,F0
1074 DATA 04,E8,C8,D0,F4,60,18,AD
1075 DATA 0B,C0,69,41,8D,0B,C0,38
1076 DATA AD,0C,C0,E9,19,90,06,8D
1077 DATA 0C,C0,4C,60,C2,AD,0C,C0
1078 DATA 69,41,8D,0C,C0,AD,05,C0
1079 DATA 6D,07,C0,48,AD,06,C0,6D
1080 DATA 08,C0,8D,0E,C0,68,6D,0A
1081 DATA C0,8D,0D,C0,AD,0E,C0,6D
1082 DATA 09,C0,8D,0E,C0,38,E9,19
1083 DATA 90,06,8D,0E,C0,4C,96,C2
1084 DATA AD,0E,C0,69,41,8D,0E,C0
1085 DATA AD,0D,C0,E9,19,90,06,8D
1086 DATA 0D,C0,4C,AB,C2,AD,0D,C0
1087 DATA 69,41,8D,0D,C0,A0,01,AD
1088 DATA 0B,C0,CD,3C,03,D0,20,C8
1089 DATA AD,0C,C0,CD,3D,03,D0,17
1090 DATA C8,AD,0D,C0,CD,3E,03,D0
1091 DATA 0E,AD,0E,C0,CD,3F,03,D0
1092 DATA 06,20,64,C3,4C,7A,C0,AD
1093 DATA 10,C0,D0,11,98,48,68,4C
1094 DATA F7,C0,AD,10,C0,F0,01,60
1095 DATA A9,04,4C,F7,C0,A4,FD,A9
1096 DATA 27,91,7A,A2,00,C8,BD,0B
1097 DATA C0,91,7A,C8,E8,E0,04,D0
1098 DATA F5,A9,00,91,7A,20,64,C3
1099 DATA 4C,7A,C0,A0,00,B9,00,02
1100 DATA F0,11,C9,28,D0,03,EE,03
1101 DATA C0,C9,29,D0,03,EE,04,C0
1102 DATA C8,D0,EA,AD,03,C0,CD,04
1103 DATA C0,D0,01,60,A9,05,4C,F7
1104 DATA C0,A9,20,8D,00,D4,8D,01
1105 DATA D4,A9,09,8D,05,D4,A9,0F
1106 DATA 8D,18,D4,60,20,41,C3,A9
1107 DATA 81,20,77,C3,A9,80,20,77
1108 DATA C3,4C,71,C3,20,41,C3,A9
1109 DATA 11,20,77,C3,A9,10,20,77
1110 DATA C3,A9,00,8D,04,D4,60,8D
1111 DATA 04,D4,A2,70,A0,00,88,D0
1112 DATA FD,CA,D0,FA,60,END
```

# NEXT MONTH

## Watch For These Upcoming Issues

**Commodore Microcomputers**, March/April: Technical editor Jim Gracely gives you an in-depth preview of Commodore's newest computer—the one you've all been waiting for—the Commodore 128. Officially announced in January, the Commodore 64's fully compatible big brother is causing quite a stir among users.

ALSO IN THIS ISSUE:

- An astronomer reviews Commodore's *Sky Travel* package.
- Find out how you can start a Young Astronaut chapter in your town.
- Take a look at Commodore's newest modem—featuring both touch tone and rotary dialing and a built-in speaker.

**Commodore Power/Play**, April/May: Don't miss the fun as we bring you our first annual April Fool special issue. Would you believe a column written by Jim Oleofield? How about a new slant on games by the "Beefstick Lunatic"? No doubt about it, we get silly in April.

AND YOU'LL ALSO FIND:

- A revealing look at sports-type games, including baseball, football, basketball and more.
- Insights into the mind of Douglas Adams, author of the best-selling *Hitchhiker's Guide to the Galaxy*, now a game for the Commodore 64.
- Reviews of the games you've been thinking about buying, including *Boulder Dash, Castles of Dr. Creep* and *Ultima II*.

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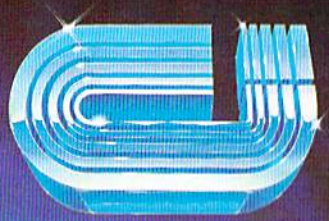

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